

Farm Chemicals

Pioneer Journal
of the Industry

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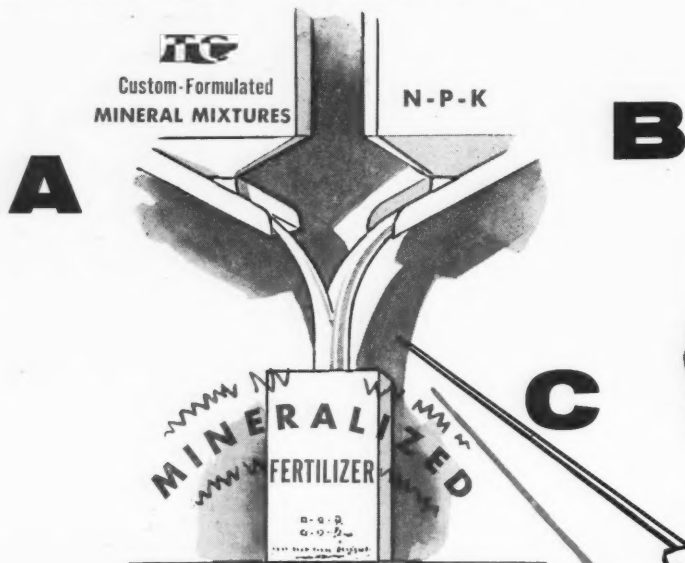
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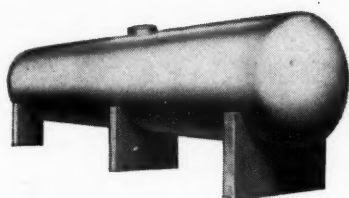
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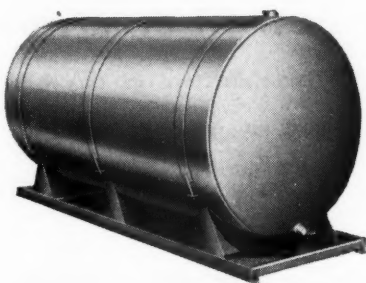


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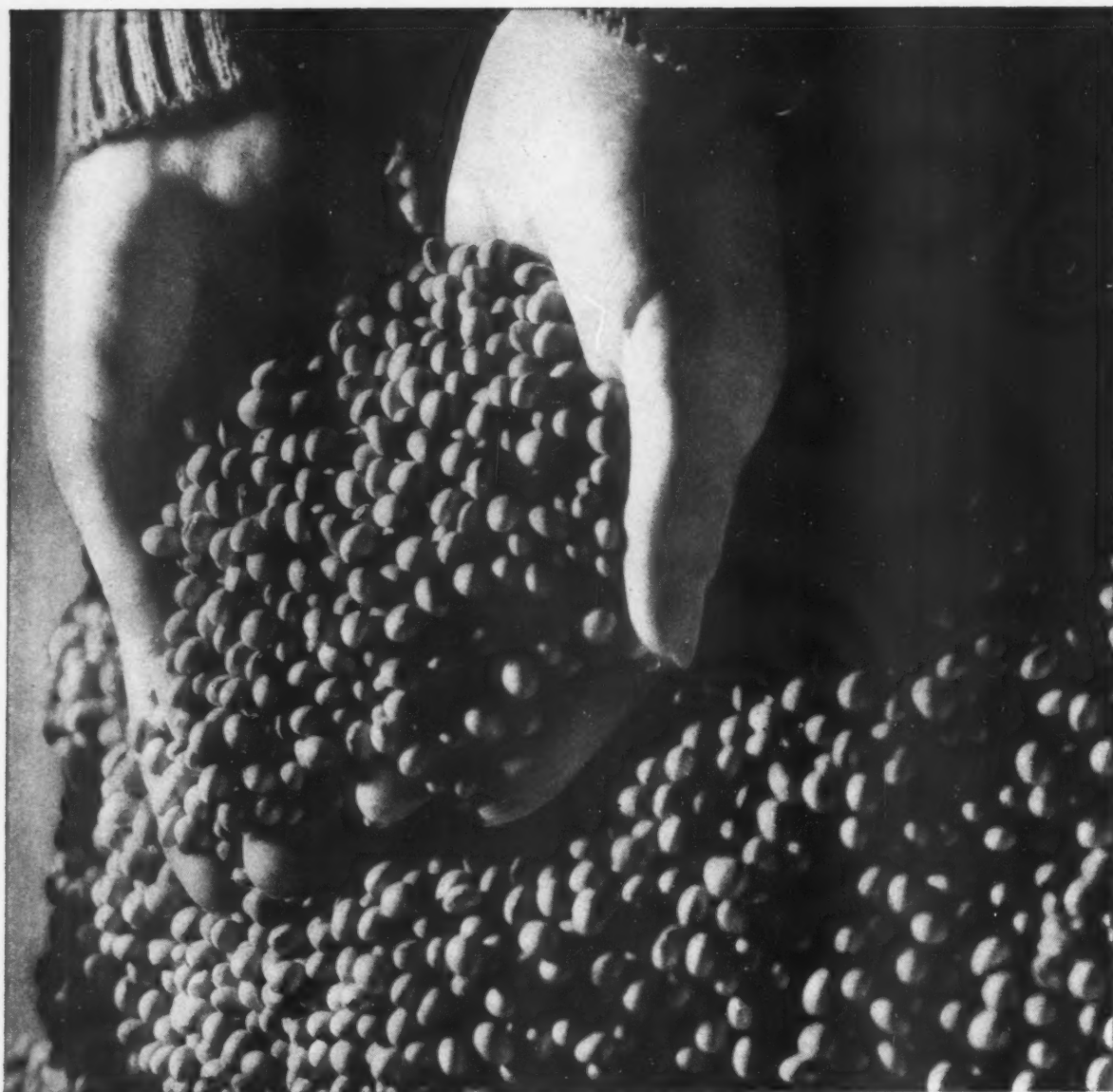
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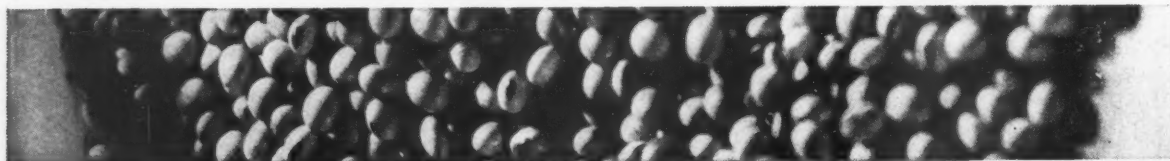
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Cover Story

On December 21 last year, anhydrous ammonia began to flow from the Woodstock (Memphis), Tenn. plant of Grace Chemical co. in cars such as the one pictured. Early this year capacity at the rated 250 tons per day or better is anticipated and the urea plant is soon expected to begin operation.

In this issue . . .

Proposed rulings on pesticide tolerances have been generally accepted by industry but NAC and a few chemical companies have presented statements suggesting some modifications. For a short summary by John Harms, see page 30.

Grace Chemical's Woodstock (Memphis), Tenn., nitrogen plant is now officially dedicated and we present, on pages 32-33, a description of the production facilities and company personnel.

Part I of a review of insecticide-fertilizer mixtures begins on page 35 of this issue. Written by Walter M. Kulash, it provides historical background and considers some of the problems encountered to date. Of special interest is a comprehensive table covering many of the mixtures that have been used, citing the pest, crop and the experimenters.

A preliminary report on 1953-54 fertilizer consumption by USDA's Walter Scholl and his co-workers appears on page 45. Although tonnage did fall off slightly the consumption of primary plant nutrients did continue to climb.

Meta-Systox, a new systemic insecticide, is the subject of an article by R. C. Scott, beginning on page 48. In addition to information on this material, Scott traces the development of systemics. This is based on a talk presented at the last meeting of the Canadian Agricultural Chemicals Association.

Spencer Chemical's Joe Culpepper rejoins us in this issue with an edited version of his latest address before Spencer salesmen. See page 54.

A unique fertilizing method was utilized to establish cover on steep banks and cuts along the West Virginia Turnpike. For a short feature see page 58. Incidentally, there are some intriguing possibilities of agricultural application.



INDUSTRY NEWS

First Grace Ammonia Shipment to Swift



John G. Carriere (left) Grace Chemical co.'s Memphis plant manager, and C. U. Ellis of Chicago, superintendent of Swift's Plant Food div., shake hands on the deal as Swift & co. buys the first carload of ammonia produced at Grace's Memphis plant. Frank Ronan, Grace Chicago district mgr., looks on. For a complete story on the new plant and its dedication, see page 32.

Dedicate \$7 Million USI Tuscola Nitrogen Plant

U. S. Industrial Chemicals co.'s new \$7 million plant in Tuscola, Ill., for production of synthetic ammonia and fertilizer nitrogen compounds was formally dedicated on Jan. 21.

Representatives of government, industry and agriculture were on hand to witness the release of the first tank car of anhydrous ammonia for direct application to the soil, to Central Illinois Fertilizer co., Tuscola, distributor in the agricultural area surrounding the plant.

The ammonia plant is adjacent to USI's sulfuric acid plant, which went on stream last September. Its capacity will be 50,000 tons of anhydrous ammonia per year.

Preview Showing for New NFA Film, "The Big Test"

About 200 key officials of government, industry and land-grant colleges attended the preview showing of "The Big Test," NFA's newly completed edu-

cational movie on soil sampling, at the Statler hotel in Washington on Dec. 10.

Produced by the association's Robert H. Engle, "The Big Test" describes, step-by-step, the approved method of taking soil samples to be used for determining plant food deficiencies in the soil. The message is woven into a plot which involves a farmer who vows he will grow a 100 pound watermelon—and almost succeeds. Script was written by J. W. Fitts, director of the soil testing laboratory of North Carolina.

The movie, which runs about 15 minutes, is available for distribution immediately. Persons or groups wishing to show the film may borrow it free of charge by writing to NFA and stating the date the film is required.

A 4½ minute television short subject based on material included in "The Care and Feeding of Garden Plants," recently published by NFA in cooperation with the American Society for Horticultural Science, is also available for booking by television stations, the association states.

Virginia Issues 1955 Fert-Pesticide Rulings

Rulings on fertilizer-pesticide mixtures for peanuts for the 1955 season have been issued by the Division of Chemistry, Virginia Department of Agriculture, the National Fertilizer Association reported in its NFA News.

Aldrin and heptachlor are the only pesticides recommended by the Virginia Experiment Station for mixing with fertilizers. Addition of an insecticide to a fertilizer makes the mixture an economic poison under the Virginia pesticide law and necessitates registration under the law in addition to registration as a fertilizer.

Full information on how to register fertilizer-aldrin and fertilizer-heptachlor mixtures is included in the ruling issued Dec. 28, 1954, as well as suggested samples of wording which should appear on the outside of the bag.

Inquiries relating to the Virginia rulings may be made through the Division of Chemistry, Virginia Department of Agriculture, 1123 State Office Building, Richmond 19, Va.

Wilbur-Ellis Building New Insecticide Plant

Construction of a new, completely modern insecticide plant has been started by Wilbur-Ellis co. in Seattle, Wash. Designed to produce blended dusts and spray concentrates required by growers in the Northwest, the plant will be in operation for the coming season.

Spanish Potash Case Dropped, Others Continue

The Treasury dept. has reported that Spain is not dumping muriate of potash on the US market at less than fair value and that investigations of Spanish imports which were begun on Nov. 24 will be dropped.

Public hearings in the Tariff Commission's investigation into potash from West Germany and France have been scheduled for Feb. 8, while hearings on East German material were expected to get under way Jan. 25.

Superior Fert. & Chem.

Buys Growers Fertilizer

G. D. Sloan, Superior Fertilizer and Chemical co.'s general manager, has confirmed the purchase by Superior of the assets of Growers Fertilizer co., Fort Pierce, Fla. All details of the transaction have not been completed and the company is still operating, under the direction of Superior, as Growers Fertilizer co.

George Marrs, Superior plant superintendent, has been transferred to Fort Pierce to serve as plant and office manager.

Although Growers will be absorbed into the Superior organization, Sloan said that no changes in personnel have been contemplated.

I. P. Thomas Opens

Phosphoric Acid Plant

A new plant for production of concentrated phosphoric acid has been put into operation at the Paulsboro, N. J., works of I. P. Thomas div., Pennsylvania Salt Manufacturing co.

Designed and built by Chemical Construction corp., the new unit is rated to produce 25 tons of phosphorus pentoxide per day in the form of concentrated phosphoric acid, to be used by Thomas primarily in making triple superphosphate and high strength granular fertilizers.

Mid-South Plans New

NH₃ Storage, Distribution

A five million gallon storage system for anhydrous ammonia plus the nation's first river-rail-highway distribution facilities will be placed in operation about March 1 by Mid-South Chemical co., the company has announced. Heart of the setup will be an eight acre distribution center on Presidents Island, an industrial area off the Memphis riverfront with harbor facilities for Mississippi river transportation as well as rail and truck loading docks.

Mid-South officials have a specially constructed barge with a battery of six pressurized tanks built into the hull. Capacity of the barge is 800 tons anhydrous NH₃. Installation has begun on fifteen 30,000 gallon ammonia tanks for storing the ammonia on the island. It will be piped from the barge through six-inch lines with the aid of a special pump at a rate of 1,000 gallons per minute. In addition, the company will have 100 railroad tank cars, each capable of storing and transporting 25 tons of ammonia.

FEBRUARY, 1955

Tailings

Granular insecticides have been found more effective than sprays and dusts in controlling the corn borer according to Iowa State Entomologist John H. Lilly. Applied with a modified grain drill mounted on high clearance equipment, the toxic particles sifted onto the corn and into leaf whorls where they proved effective on both first and second brood borers.

A Univ. of California researcher, Dr. D. I. Arnon, has succeeded in duplicating photosynthesis outside living plant cells. Arnon and co-workers discovered that chloroplasts perform the process, even when removed from the living plant.

Captan hit the big time in January with a full scale feature article in the READERS' DIGEST. The writer provided an interesting story on the development and application of this fungicide.

A much less optimistic note concerns a major insecticide producer scheduled to discontinue operation. No details can be released at this time but the plant is reported slated for dismantling.

G. H. Doescher, the Granulite co., relates plans to eventually move some several million tons of Granulite per year into agriculture. This material, water granulated blast furnace slag produced by Inland Steel at Indiana Harbor, Ind., was the subject of a paper delivered at the St. Paul ASA meetings by Doescher. Copies of the paper relating to the potential of Granulite in soil fertility are available from the company at 605 W. Washington St., Chicago 6.

Weeds are prolific to say the least. A booklet from the North Dakota Extension Service cites these figures on seed production for some common pests: Wormwood plant (1,075,000 seeds), Russian thistle (24,700), Marsh elder (82,150), Frenchweed (7,040) and common mustard (2,700).

The Ohio AES estimates that insects caused over \$30 million damage to Ohio crops last year. A breakdown shows \$9 million attributed to the European corn borer and nearly \$7 million to the corn earworm and meadow spittlebug. Apple growers lost close to a half million, due primarily to codling moth damage.

Fungicides Decrease

Plant Smog Damage

Certain organic fungicides can protect plants from smog damage, according to results of laboratory and field tests. Bean plants which were dusted with zineb and thiram suffered little or no damage during recent smog sieges in Southern California, while unprotected plants in the same plot showed typical leaf damage, stated Dr. James B. Kendrick, University of California plant pathologist.

Dusting was more effective than spraying, the preliminary tests indicated, because the chemical had to coat the underside of plant leaves in order to

give protection. Coating topside only did not stop smog damage.

University of California is conducting investigations into other methods of protecting plants from air pollutants as well as basic causes of this damage.

Favorable Vote Cast In 'Nickels' Referendum

Although "Hurricane Hazel" reigned on the day set for the "Nickels for Know-How" referendum, North Carolina farmers from every county cast votes, and 94 per cent of the total favored continuation of the voluntary assessment on feeds and fertilizers to finance agricultural research.

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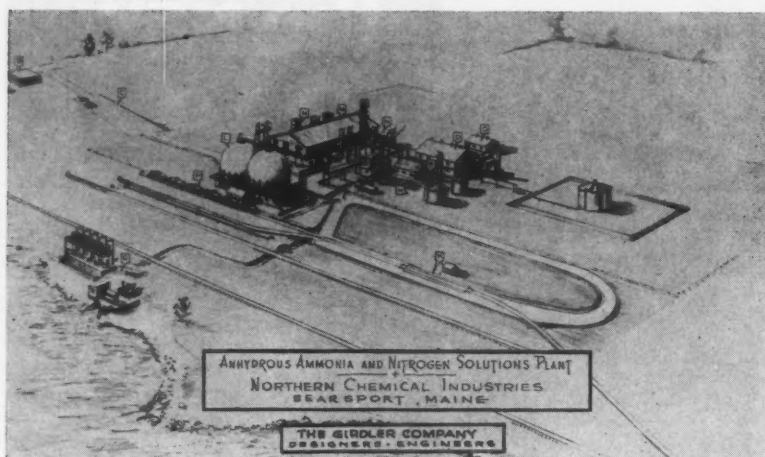
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Plans Complete for NCI Ammonia Plant



PLANs for Northern Chemical Industries' entry into the anhydrous ammonia industry have been completed, James E. Totman, NCI president, recently announced. Preliminaries have been underway since about a year ago when the company was granted a certificate of necessity in the amount of approximately \$9 million.

An affiliate of Summers Fertilizer co., NCI will enjoy a captive requirement of nitrogen representing 48 per cent of the plant's rated capacity. Several other

unusual advantages are involved—location adjoins Searsport's famous deep water harbor, thus permitting economical handling of imports and exports and to date it is the only plant in North America with integrated mixed fertilizer, superphosphate and other raw material and manufacturing facilities.

It will be the first plant using exclusively the Texaco-Hydrocarbon Research process for producing ammonia synthesis gas from Bunker C fuel oil by partial oxidation with oxygen.

The Girdler co. has been awarded the prime contract to erect a 125 ton per day anhydrous ammonia plant, a 60 ton per day nitric acid plant, a complete nitrogen solutions plant along with a 7,500 KW power plant.

Of the approximately 43,000 tons of ammonia produced per year, about 18,000 tons will be used in the production of some 32,000 tons of nitrogen solutions, stated Totman. The balance of the ammonia will be sold to sulfite pulp producers, a large number of which are located in close proximity to Searsport.

Thus far, Totman continued, the use of anhydrous ammonia for direct application to the soil has not been practiced in New England as in other parts of the country. The topography of the area does not lend itself as well to this particular use as the Midwestern plains but, with ammonia readily available from the new plant, it is believed that farmers in the area to be served will materially increase their nitrogen consumption via the various derivatives that NCI expects to make.

Recently, NCI elected three new directors to its board—C. M. Hutchins, president of Bangor and Aroostook Railroad; James T. Baldwin, treasurer of C. H. Sprague & Son co. and A. F. C. van den Bergh, director general of Diamond Fertiliser & Chemical co. of London, England.

Bids Open on FOA Fert.

For Greece, Indochina

The Foreign Operations Administration has announced issuance of procurement authorizations as follows:

Indochina—\$200,000 for purchase of nitrogenous fertilizers in the US and possessions, Canada, Latin America, Japan and European participating countries under PA 95-230-00-70-5005. Contracting period began on Dec. 9, 1954 and extends to April 30, 1955. Delivery date is Sept. 30.

Greece—\$1,000,000 for purchase of nitrogenous fertilizers in the US and possessions, Canada, Latin America and European participating countries under PA 40-230-00-74-5003. Contracting period began on Dec. 16, 1954 and extends until March 31, 1955. Delivery date is June 30.

TVA Fert. Sales Report

During the fiscal year ended June 30, 1954, nearly 360,000 tons of TVA fertilizers were sold in the educational sales program through about 4,000 retail outlets in 35 states. TVA had direct contracts for distribution with three regional cooperatives, whose 56 wholesale members and affiliates served 35 states. It had similar contracts with 13 private industry firms—five more than last year—serving 21 states.

"The widespread introduction of TVA fertilizers in the educational sales programs is serving to bring fertilizer distributors and the land-grant colleges together in joint efforts to establish new frontiers of fertilizer use," states TVA's annual report.

NH₃ on BDSA Survey List

Ammonia will be one of the next materials included in surveys of distribution and production patterns of important chemicals which are being conducted by the Chemical and Rubber div. of the Business and Defense Services Administration.

GSA Orders DDT for Asia

In December suppliers were asked by the General Services Administration to furnish 16,596,000 pounds of DDT early this year for use under the health programs of India, Indochina, Iran, Pakistan and the Philippines.

Classified

FERTILIZER SPECIALIST with 25 years experience in tropical soils and crops desires connection with fertilizer firm or raw material producer in North or South America as educational promoter, traveller or salesman. White, age 45, speaks English, Spanish and French. Address "485," care FARM CHEMICALS, Philadelphia 7.

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FARM CHEMICALS

Canadian Plant Food Use Shows Slight Gain

Consumption of mixed fertilizer in Canada increased 2 per cent in 1953-54 over 1952-53, from 651,000 tons to 640,000 tons, the NFA News recently reported.

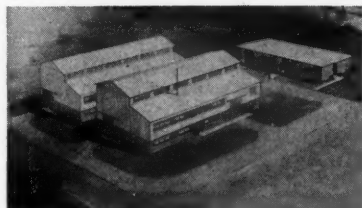
Although national consumption increased, eight provinces reported decreased fertilizer usage, including the Maritime Provinces (Newfoundland, Prince Edward Island, Nova Scotia and New Brunswick) and Western Canada (Manitoba, Saskatchewan, Alberta and British Columbia).

Canada's most intensively cultivated areas, Quebec and Ontario, showed an increase in usage.

Battelle Expands Units

The first units of facilities for an expanded program of pilot-plant and large scale research are nearing completion at Battelle Institute's recently purchased 400 acre site just outside Columbus, O.

Provided initially in the \$300,000 construction program are two major buildings, totaling 13,000 square feet and designed specifically for large-scale



Battelle Institute's West Jefferson O., laboratories for large scale experimental work. Buildings in foreground and on extreme right were completed January, 1955; the building at left is the first of a contemplated series of future laboratories.

experiment work. Additional buildings are contemplated and will be custom built to fill specific industry needs as they arise.

The new facilities, according to Battelle's president and director, Clyde Williams, will be used primarily for large-scale studies in chemical engineering, metallurgy and minerals processing.

Meat Production Upped By Nitrogen in Cal. Tests

Use of nitrogen was credited with doubling meat production in five California counties by University of California agricultural extension specialists. It also speeded growth of annual grasses after fall rains, producing feed earlier for cattle and sheep.

Test ranges were fertilized with nitrogen and nitrogen-phosphorus mixtures in the fall of 1953 in Alameda, Glenn, Santa Clara, Solano and Tehama counties. Actual meat production of 693 animals on 1,118 acres, 520 of them fertilized, was used to measure results.

In four of the tests, profits from the increased meat production equaled or exceeded the fertilizer costs, but in Tehama county tests, although lamb and mutton production increased fourfold, it did not entirely pay fertilizing costs.

Further tests are now being conducted.

Proceedings of Mosquito Group Meet Available

Copies are now available of the official proceedings of the American Mosquito Control Association-New Jersey Mosquito Extermination Association annual meeting held in Atlantic City during March, 1954.

They may be obtained at cost from the Department of Entomology, Rutgers University, New Brunswick, N. J.

Sees Big Gain in Aerosols

Aerosol production in 1954 has been estimated at 200 million units, and "the surface of the aerosol industry has hardly been scratched," stated Jack Schenberg, Bostwick Laboratories vice president, in a 1955 outlook statement.

A 40 per cent increase in gross sales is expected by Bostwick during 1955. This substantial increase, said Schenberg, will be geared to "our number one product, Hep, the nation's best selling insecticide, and a number of other new items to be introduced at the National Housewares show in Chicago."

MCA, BDSA Report on Sales, Expenditures

MCA estimates that chemical sales last year will be near the record breaking 1953 figure of \$19.865 billion. Sales figures for chemical and allied products through September totaled an estimated \$15.185 billion, slightly off from the first nine months of 1953.

Based on six-month figures from Government sources, profit after taxes should parallel the 1953 figure of \$1.053 billion. Cash dividends paid by the chemical and allied products industries were \$325 million for the first six months of 1954, 13 per cent of those paid by all manufacturing industries.

A decline in capital equipment expenditures by the chemical and allied industries for 1954 was forecast by the Business and Defense Services Administration. A drop of 21 per cent from the 1953 peak of \$1.550 billion is estimated, an indication of the sensitivity of the industries to changes in the industrial economy.

BDSA also stated that anticipated capital expenditures for the first quarter of 1955 are set at \$263 million, 22 per cent below the same 1954 period.

New Plant for Summit

A new, completely mechanized plant has been built by Summit Mining corp. at Aspers, Adams county, Pa. Designed to produce various grades of Sericite from granular to extremely fine material, the new plant will incorporate adequate facilities for storage of crude and finished product, plus the most modern means of shipping, according to C. M. Dolliver, Jr., Summit production manager.

New Spencer Film Features 'Mr. N'

The struggles of a gentleman farmer recently retired from the city are recounted in a humorous film entitled, "George Tackles the Land," which has just been released by Spencer Chemical co.

A 27 minute full-color film, the theme is fertilizer usage. From the outset, George's wife, Annabelle Johnson, has a green thumb where gardening is concerned, but George is an immediate failure at farming.

Then George meets "Mr. N," a powerful little elf symbolizing nitrogen who shows George the light. But when George rushes back to tell Annabelle, he discovers she has known all along about the value of fertility balance, and thus the secret of her green thumb is revealed.

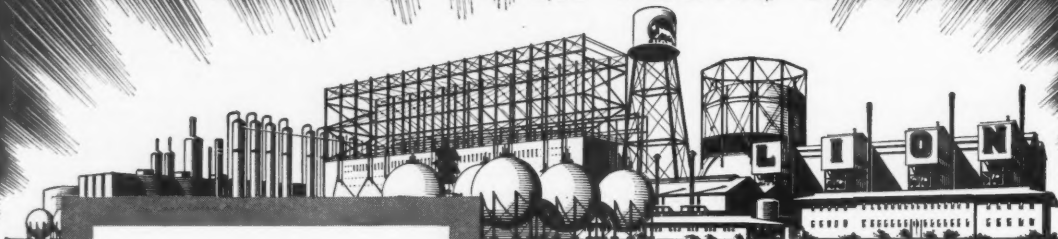
Spencer expects the film to be of use



"There's magic in nitrogen," an elf symbolizing N tells George Johnson in film "George Tackles the Land."

in dealer meetings, extension work and luncheon gatherings. A number of black-and-white copies have also been prepared for television use.

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Lion Aqua Ammonia—For formulation or acid oxidation. Ammonia content about 30%. Other grades to suit you.

Lion Ammonium Nitrate Fertilizer —For formulation or direct application. Improved spherical pellets. Guaranteed 33.5% nitrogen.

Lion Nitrogen Fertilizer Solutions —For formulation. Three types to suit varying weather and manufacturing conditions.

Lion Sulphate of Ammonia — For formulation or direct application. Uniform, free-flowing crystals. Guaranteed to contain a minimum of 21% nitrogen.

Because of Lion's leadership in nitrogen fertilizer production in the South, Lion can show you the way to **MORE PROFITS**.

When you buy your complete nitrogen requirements from Lion, you automatically put yourself in a position to improve your profit picture. Here's how:

- 1 You Save Time** • You can contract at one time, with a single dependable source, for all of your nitrogen fertilizer material requirements. And, of course, time saved today is reflected in your profits tomorrow.
- 2 You Prevent Manufacturing Delays** • Formulation material that does not have consistent quality can slow down or delay your own production needlessly. With Lion's Quality Control, you can be sure of *quality* materials. The difference will show up in your profit column.
- 3 You Solve Problems Quicker** • If you run into a formulation snag, Lion's highly trained Technical Staff will be ready to give you the kind of technical assistance that can only come from a leader. This aid can help improve your profit picture...and it's yours for the asking.

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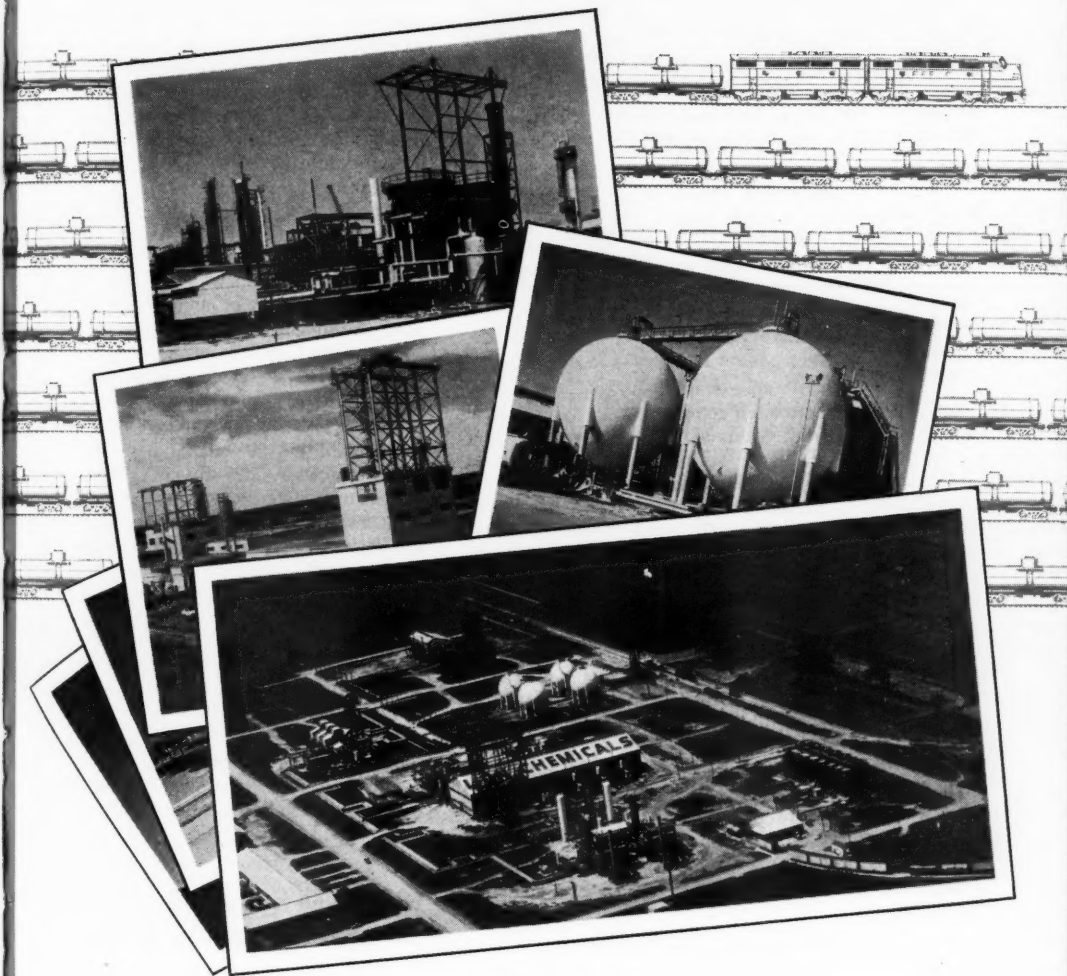
LION OIL
CHEMICAL SALES DIVISION



COMPANY
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Another 1,000 tons of NH_3 per day!

added to world production
through Chemico-designed plants
completed during 1954



Ammonia plants placed "on-stream" in 1954 for Phillips Chemical Company, Lion Oil Company, American Cyanamid Company, and Sherritt Gordon Mines, Ltd. add more than 1,000 tons daily ammonia production to the already impressive total capacity of Chemico-designed plants.

Chemico provides a *complete* project service in designing the plant, supplying all material, and erecting structures and equipment to produce ammonia from natural gas, by-product hydrogen, or other suitable raw materials.

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B. G. Pratt Moves to Paterson

After 50 years of insecticide manufacturing in New York City and Hackensack, N. J., B. G. Pratt co. has moved its office and plant to 204 21st Avenue, Paterson, N. J.

The first Pratt, spray, Scalecide, was produced in 1904, and since then more than 35 sprays have been added to the company's line, including D-X Insect Spray, Pratt's Fruit Tree Spray, Para-Scalecide and Pratt's Rose Dust.

During the past few years, the company reports that its Hackensack plant



B. G. Pratt's recently-acquired Paterson plant.

has been "literally bursting its seams." The new plant can accommodate its present line and provide room for future expansion.

Appeal Tariff Drop on Coal Chem. Intermediates

An appeal was made in December by major producers of coal chemical intermediates to the Committee for Reciprocity Information to strike these intermediates from the list of materials subject to tariff reduction at the trade agreement negotiations to be held with Japan in February.

Companies which opposed the reductions included Monsanto Chemical co., American Cyanamid co., Carwin co. and E. I. duPont de Nemours & co. President of Synthetic Organic Manufacturers Association, Samuel Lenher, led off the opposition discussion.

Doing Business in Japan

A report entitled "Establishing a Business in Japan" has just been released by the Bureau of Foreign Commerce, US Department of Commerce.

It is published as No. 54-2 in Economic Reports, Part 1 of the bureau's new World Trade Information Service. It may be obtained from the Superintendent of Documents, US Government Printing Office, Washington, 25, D. C., or from any of the Commerce dept.'s field offices for 10 cents per copy.

Integration Trend Noted

"One of the most definite trends in the chemical industry today is the integration by companies making raw materials to produce partially processed or in some cases finished products," according to a report by Richard F. Messing in a review of "The Chemical Industry"

recently published by Arthur D. Little, Inc.

As an example he cited entrance by petroleum companies into the chemical field. Many of them have formed either chemical subsidiaries or companies owned jointly with a chemical partner. Petrochemicals now supply about 25 per cent of the total chemical requirements of the US, and this figure is expected to go to 50 per cent within 10 years, he noted.

"To get more farm profits there must be increasing consumption—and increasing production. Beware of the philosophy of scarcity. Agriculture must produce—and produce in large volume to be most profitable."

... TRUE D. MORSE

No Change in Pension Plans

A recent informal survey of nationally-known companies made by Johnson & Higgins, international insurance brokers, revealed that more than 70 per cent of the companies planned no changes in their pension plans to take into account the 1954 Social Security amendments.

In a recent issue of its EMPLOYEE BENEFIT PLAN BULLETIN, J&H warns that by not adjusting for changes in the Social Security Law where necessary, employers run the risk of "creating serious inequities within the plan and establishing a precedent which may cause difficulties in the future."

AICE Hears IMC, Catalytic, Dorr Reps

At the American Institute of Chemical Engineers 47th annual meeting Secretary of Commerce Sinclair Weeks predicted that business conditions this year will be better than 1954. Construction during 1955, he said, is likely to be about 7 per cent above that of 1954, reaching an all-time high of 39.5 billion.

R. B. Thompson and Donald MacAskill of The Dorr co., Stamford, Conn., reported on a new sulfur recovery method, called the "Fluo Solids Process." This process, developed by Dorr and commercially in operation since October 1953, makes economically feasible the mining of low-grade sulfur ores, they stated.

Catalytic Construction co.'s J. W. Delaplaine and International Minerals & Chem. corp.'s R. F. McCullough discussed a new chemical process with potential economic importance, moving-bed decomposition of ammonium sulfate. Although it is usually made from ammonia and sulfuric acid, economics dictated that ammonia and sulfur oxide gases be made from the substantial amounts of by-product ammonium sulfate available at the IMC Mulberry, Fla., plant, they explained.

After satisfactory studies, a pilot plant using the moving-bed technique was designed, constructed and operated. Inert particles impregnated with zinc oxide contact ammonium sulfate in a reaction zone, where sulfur trioxide combines with zinc oxide releasing ammonia and water vapor. Inert solids, now impregnated with zinc sulfate, are heated in a lower reaction zone to release sulfur oxides.

The institute's newly elected president is Prof. Barnett F. Dodge, head of the Department of Chemical Engineering at Yale University.

1954 Sulfur Production Seen At New High by Williams

US production of sulfur from all sources reached an estimated 6,600,000 long tons, 350,000 tons more than in 1953, according to Langbourne M. Williams, president of Freeport Sulphur co. Most of this production came from 13 salt dome deposits in Louisiana and Texas mined by the Frasch hot-water process.

Output of Frasch sulfur was about 300,000 tons more than in the previous year. The gain was made possible, states Freeport, by the successful operation of Garden Island Bay, its new mine at the mouth of the Mississippi, which produced more than 500,000 tons in 1954.

FARM CHEMICALS

OVERSEAS

Australia. Cresco Fertilizers (WA) Ltd. expanded its fertilizer works at Guildford, and the plant of Albany Superphosphate co. is nearing completion. Chairman of the Cresco Fertilizers Ltd., H. W. Lyons, has reported that orders for superphosphate indicate a record season.

Belgium. Union Chimique Belge reports that the ammonia and ammonium sulfate plant being constructed for the Pakistan Industrial Development corp. is proceeding on schedule.

Costa Rica. Production, import and sales of agricultural pesticides now require approval of the General Directorate of Agriculture and Livestock.

Denmark. New regulations for the handling of pesticides have been issued in Denmark. One rule states that a product cannot be sold prior to classification for toxicity or before labels and directions for use have been approved by the Ministry of Agriculture.

Egypt. An Egyptian pesticide formulator expects to produce this year about 2,000 metric tons of BHC dusts, 400 tons of 50 per cent wettable DDT and 120 tons of 50 per cent wettable BHC. Total production of the two companies producing agricultural formulations is reported at about 7,000 metric tons a year, mainly BHC and DDT products.

Mexico. First shipment of processed sulfur from the Texas International Sulphur co.'s autoclave plant near San Felipe, Baja Calif. arrived in Mexicali. Entire output of the plant is being sold through the company's subsidiary, Azufre S. A., to an insecticide manufacturer in Mexicali.

Phillipines. The government-operated ammonium sulfate plant produced 29,593 metric tons during 1953-54. Annual capacity is 50-52,000 tons, and plans are being made to increase capacity to 75,000 tons. Current demand indicates a market for about 90,000 tons. Imports declined to 113,179 tons, of which 46 per cent was ammonium sulfate.

West Germany. Pesticide production of some 200 firms reached 118.5 million pounds in 1953 and domestic sales totaled \$25 million. Another 30 per cent is exported, with Latin America purchasing more than 40 per cent of the exports. Added to items on the import list permitting importation of commodities from dollar countries free of quantitative restrictions are organic and inorganic chemical products and fertilizers.

FEBRUARY, 1955

People

American Cyanamid co. has appointed Dr. George L. Royer administrative assistant to the general manager, Research div. He will coordinate policies on budgets, personnel and publications at the division's labs in Stamford, Conn., Pearl River, N. Y. and Bound Brook, N. J.

Aerosol and Refrigeration div. of American Potash & Chemical corp. has appointed Harold A. McDermott, Sr., as its sales representative in Burlington, Vt. and New York State, excluding metropolitan New York.

Robert B. Coons, vice president of American Potash & Chemical corp., has been named a director of the company, increasing the size of the board from eight to nine. Coons, who is in charge of industrial relations, purchasing and traffic, joined AP&C in 1946 as assistant to President Peter Colfax and was named a vice president in



Coons

August, 1947.

W. H. Barrows has been named New England district manager by Arkell & Smiths. Prior to his recent appointment he had been a sales representative in the New England area.

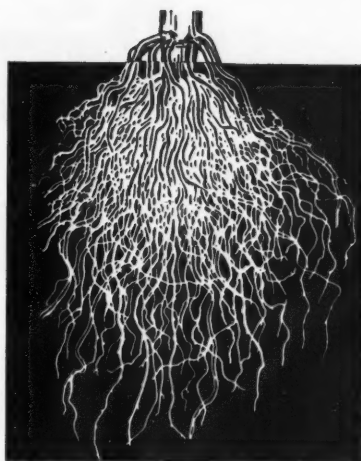
Died: Liberty Hyde Bailey, 96, at his home in Ithaca, N. Y. on Christmas Day. He was author of more than 100 volumes on botany and horticulture.

E. C. Rook has been named vice president and general manager of Blaw-Knox Equipment div., succeeding G. L. Dirks, who has resigned.

J. W. Miller has been elected executive vice president and director of Brea Chemicals, Inc. The former Southwest territory manager of Union Oil co. assumed his responsibilities with Brea Jan. 1.

Ronald L. Clark has been named supervisor of market research and development for Brea Chemicals, Inc. He formerly was assistant director of market research for Vick Chemical co.

New director of the Chemical and Rubber div., Business and Defense Services Administration is Herbert W. Bertine of General Chemical div., Allied Chemical & Dye corp.



See

"Corn's Hidden Enemies..."

a helpful film on
soil insect control

An educational film depicting the destruction of corn by rootworms and other soil insects and how they can be controlled.

It shows an actual field operation at the Howard Waters Farm, Danville, Iowa.

Available for showing, from our film library . . . to Vo-Ag Teachers, County Agents, Formulators and Dealers. Write for the loan of a free print (and specify an alternate date please!) Shell Film Library, 624 South Michigan Boulevard, Chicago 5, Illinois.

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in Fertilizer History or Farm Customers...

Just about every time farmers turn the pages of a farm magazine this year of 1955, they'll be turning to full page advertisements of one or more ARCADIAN® products. ARCADIAN UREA 45 — Nitrogen Solutions for Direct Application— American Nitrate of Soda — A-N-L® Nitrogen Fertilizer and others. Full pages and half pages that smack the reader right in the eye with outstanding advantages of these ARCADIAN Fertilizers that are as modern as tomorrow's agriculture. These selling messages will be seen by millions of farmers every month of the fertilizer season. Some 1500 local newspapers will also carry ARCADIAN advertising urging farmers to buy.

All this, plus continued radio campaigns on big stations, and small stations, too, are putting ARCADIAN products in the minds of your customers — to move more ARCADIAN products. As an ARCADIAN Distributor you can move them at a profit through your place of business.

This year it will pay better than ever to stock and sell ARCADIAN Fertilizers getting this intensive advertising support. Get your full quota of aids to help you sell easier, faster, more. The time is ripe — the time to stock ARCADIAN is right now. For full information, fill in the coupon below.



Arcadian®



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45% Nitrogen Pellets
- ☐ **12-12-12 Granular**
Fertilizer
- ☐ **American Nitrate of Soda**
Improved Granular
- ☐ **A-N-L® Nitrogen Fertilizer**
Pelleted

Nitrogen Solutions

- ☐ Non-pressure
URAN* and FERAN*
- ☐ Low-pressure
NITRANA® and URASOL*

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New Kansas City district manager for **Carbide & Carbon Chemicals co.** is H. E. Klein, former assistant district manager for the area.

New vice president of **Carbide & Carbon Chemicals co.** is John A. Field. He will be responsible for sales development and related activities.

Dr. R. L. Bateman has been named to the new post of director of product development by **Carbide & Carbon Chemicals co.** He will work with John A. Field, vice president in charge of sales development and related activities.

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ENGINEERING SERVICE
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Balanced Output Plant

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We will make on order, in any concentrate, formulations
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Write for Quotations

BARCO CHEMICALS, INC.
67 Butner St., Des Moines, Iowa

Replacing Dr. Bateman as manager of the Fine Chemicals div. is W. A. Woodcock. Newly named manager of the Agricultural Chemicals div. is Dr. R. H. Wellman.

Bernard Schneider has been promoted to chief engineer for **Chain Belt co.'s** Conveyor Equipment section. He has almost 30 years' experience in conveyor engineering work.

Climax Molybdenum co.'s vice president, Arthur Linz, has resigned to open his own office as a technical consultant at 551 Fifth Ave., New York City.

Columbia-Southern Chemical corp. management changes:

C. K. Ballard named manager of production; A. T. Raetzsch succeeds Ballard as works manager at Lake Charles, La.; N. J. Ehlers named assistant technical director.

Dwight R. Means, vice president, has reduced his work schedule to a half-time basis and will serve in consulting capacities. His engineering responsibilities will be handled by R. L. Hutchinson, general manager of operations, and his technical responsibilities by Technical Director J. A. Neubauer.

Richard E. James has joined the staff of the Industrial Chemical Sales dept., **Commercial Solvents corp.** He formerly was with Swift & co.

Died: Arthur L. Trainor, 60, specialist dry cleaning and grain fumigant product sales for **Diamond Alkali co.**, in Independence, Mo., on Dec. 16.

F. C. Peterson has been named director of industrial relations for **Dow Chemical co.**

Died: Eugene duPont, 81, a director of E. I. duPont de Nemours & co. and great-grandson of the company's founder, on Dec. 15.

New secretary of **Federal Chemical co.** is Frederic H. Courtenay, who

has been with the concern for five years working in the Sales and Production depts. Other appointments include Clark L. Kelly, Jr., assistant credit manager, and Samuel Gwathmey and W. Roberts Wood, directors. The retirement of Lyman C. Martin and W. R. Cobb created the board vacancies.

Joseph B. Cary retired from active management with **Food Machinery and Chemical corp.** on Dec. 31, but will continue as a member of the company's board of directors and Executive committee.

Geigy Chemical corp. has named Dr. Rolf Bernegger manager of its plant at Cranston, R. I. He will continue to act as head of the plant's Production dept.

The company's McIntosh, Ala., plant engineer, Don M. Jones, has been named plant engineer at Cranston, replacing Dr. S. Marsh, who has resigned.

William L. Burt, vice president of B. F. Goodrich Chemical co., has been named president of **Goodrich-Gulf Chemicals, Inc.** He succeeds William S. Richardson, who will continue as a member of the board of directors.

John K. Speicher has been named manager of technical publications for **Hercules Powder co.'s** Advertising dept, succeeding Oscar A. Pickett, who has retired.

Creation of a new division of the Advertising dept.—the Agricultural Advertising div.—also was announced, with Edwin H. Ginn as manager.



Crockett

continues as chairman of the Hollingshurst board.

International Minerals & Chemical corp. appointments: F. B. Bowen, production manager, Phosphate Minerals div.; R. H. Linderman, domestic sales manager, Phosphate Minerals div.; Edward F. Perkins, assistant export sales manager. Bowen will headquarter in Bartow, Fla.

Lamar M. Fearing and William S. Snyder have been appointed assistant general sales managers of **International Paper co.**

James W. Kellogg has retired from duties as manager of Chilean Iodine Education Bureau's Chicago office. He has moved to Atlantic City to open an eastern office of the recently formed James W. Kellogg co., producer and distributor of diet supplements.

Koppers co.'s industrial relations manager of the Metal Products div., Melvin S. Griffith, Jr., has been promoted to industrial relations manager for the entire company.

Will K. Holmes has joined the sales staff of Master Tank & Welding, Dallas, Tex. to specialize in the sale of anhydrous ammonia equipment.

Minerals & Chemicals corp. of America has appointed Robert W. Wilkerson to the newly created position of advertising and sales promotion manager, with headquarters at the home office in Metuchen, N. J. He had been account executive and secretary of Kenyon-Baker co., and advertising agency in Newark.

Monsanto Chemical co.'s Inorganic Chemicals div. advertising manager, H. Chandler Holmes, has been named creative service manager of the company's Advertising department.

Monsanto Chemical co.'s director of advertising and public relations, Howard A. Marple, has been elected a director of the Association of National Advertisers.

Transfer of William S. B. Vye to the administrative services section of Monsanto Chemical co.'s Inorganic Chemicals div. Sales dept. recently was announced by the company.

Harry M. Anderson has joined the Chemical Research dept. of Monsanto Chemical co.'s Research and Engineering div. in Dayton.

Elbert W. Burr has been appointed manager of the Personnel Development section of Monsanto Chemical co.'s Personnel Relations dept. He was formerly with International Harvester co.

Val E. Weyl, editor of NAC News and Pesticide Review, the official publication of the National Agricultural



Weyl

Chemicals Association, has announced his resignation. He had been with the association almost four years. As an entomologist, Weyl served with two divisions of USDA's former Bureau of Entomology and Plant Quarantine and with Agricultural Chem-

FEBRUARY, 1955



Scraper Storage Machines consist of these essentials:

- (1) a hoist with power unit, either electric, diesel or gasoline.
- (2) the Crescent Scraper Bucket.
- (3) the operating cables and guide blocks.
- (4) a method of shifting.

(The above installation uses a monorail and tail trolley system to shift the Crescent to another part of the building.)

A Sauerman Roller-Bearing Hoist can be placed almost anywhere inside the storage building or outside. Crescent Scrapers handle any bulk chemical at rates ranging from 20 to 600 cu. yds. per hour.

Various methods of shifting can be used, including the use of a third hoist drum or a separate shifting winch. Both of these methods give automatic control from the operator's station, with no personnel entering the storage area. One man controlling one machine, stores or reclaims at the lowest cost for labor and maintenance.

For ways to reduce your material handling costs, write to Sauerman's experienced engineers. Request Catalog E, *Bulk Storage by Scraper* and pertinent Field Reports on the handling of your material by Sauerman Machines.

SAUERMAN BROS. INC.

642 S. 28th AVE.

BELLWOOD, ILLINOIS

icals div. of The Sherwin Williams co., Cleveland, O. His headquarters for the immediate future will be at 6611 Williston Place, Falls Church, Va.

Election of Paul C. Jameson as secretary and treasurer has been announced by **National Distillers Products corp.** He succeeds T. A. Clark, who has resigned as an officer and director after 45 years with the company. Kurt Windler has been elected assistant treasurer.

Travis V. Rankin has been appointed general sales manager in charge of sales of all products at **Nopco Chemical co.**'s Pacific div., succeeding Harold A. Swanson, recently named vice president in charge of Nopco's Vitamin div. Walter E. Brewer replaces Rankin as central district sales manager and continues as manager of the company's Eastern Industrial Sales district.

Dr. Samuel L. Tisdale has been named director of the **North Carolina Department of Agriculture's** Soil Testing div., succeeding Dr. J. W. Fitts, who has resigned to devote his full attention to soils research in the Agronomy dept. of the N. C. State College.

New production manager in charge of all manufacturing operations of **S. B. Penick & co.** is Harold E. Fletcher. He will locate in Lyndhurst, N. J.



Newly appointed manager of **S. B. Penick & co.**'s Insecticide div. is Frank Seeland. He has been active in the farm chemicals field for more than 10 years, since 1952 with Penick.

Norman E. Hathaway has been named western sales manager for **Oronite Chemical co.**, a subsidiary of Standard Oil Co. of Calif. His headquarters will be in San Francisco.

Joseph Hickson has been named field sales representative of **Pennsylvania Salt Mfg. co.**'s B-K dept.

The new position of assistant sales manager for **Pennsylvania Salt Mfg. co. of Washington's** Heavy Chemicals div. is being filled by James M. McCullough.

Richard B. Tucker has relinquished his position as executive vice president of **Pittsburgh Plate Glass co.** and reduced his work schedule to a half-time basis. He will retain the title of vice president and continue general super-

vision of glass research, foreign operations and the Export dept.

Rohm and Haas co.'s secretary, S. C. Kelton, has retired, but will continue as a director of the company. Assistant Secretary F. J. Rarig has been elected acting secretary.

New assistant advertising manager for **Simplicity Engineering co.** is Richard L. Henson, formerly with Ruthrauff and Ryan advertising agency, Consumers Power co. and Capitol Advertising.

The retirement of Carl H. Hartman, vice president in charge of multiwall bag development, has been announced by **St. Regis Paper co.** He will serve the company in a consulting capacity.

H. Stanley Hangen, vice president of **St. Regis Sales corp.** retired on Dec. 31 but will continue to serve in a consulting capacity.

Dr. Leland G. Butler has been appointed director of technical service and development, eastern US, for **Standard**



Butler

Agricultural Chemicals, Inc. A Rutgers University Ph.D. in agronomy and a weed control specialist, Dr. Butler has spent a year in Venezuela experimenting with chemical weed control on food crops as a Fellow of the Research Institute of the International Basic Economy corp.

Sales manager for **Standard Oil co.** of Ohio's newly organized Petrochemical dept. is Henry J. Coleman. Since joining Sohio in Cleveland in 1946, he has served as staff assistant in marketing



Coleman

research, advertising manager and chief of site development in the Marketing dept.

Sohio also announced appointment of Hubert H. Tucker as director of agricultural service for the Petrochemical dept. He had been president of Coke Oven Ammonia Research Bureau at Columbus.



Tucker



McGowan

of market development, and will headquarter in the Stauffer New York office.

James S. Coale announced his retirement as board chairman of **I. P. Thomas & Son co.** at a recent dinner



Coale

honoring him on the completion of 56 years association with the company.

Coale joined the Camden-Paulsboro fertilizer company as vice president in 1898, succeeded the late Henry H. Lippincott as president in 1939 and was elected chairman of the board in 1949.

Died: Ira C. Young, 70, retired treasurer of **F. W. Tunnell & co.**, in late December at his Philadelphia home.

Wesley A. D'Ewart of Wilsall, Mont., has been named a special assistant to the Secretary of Agriculture.

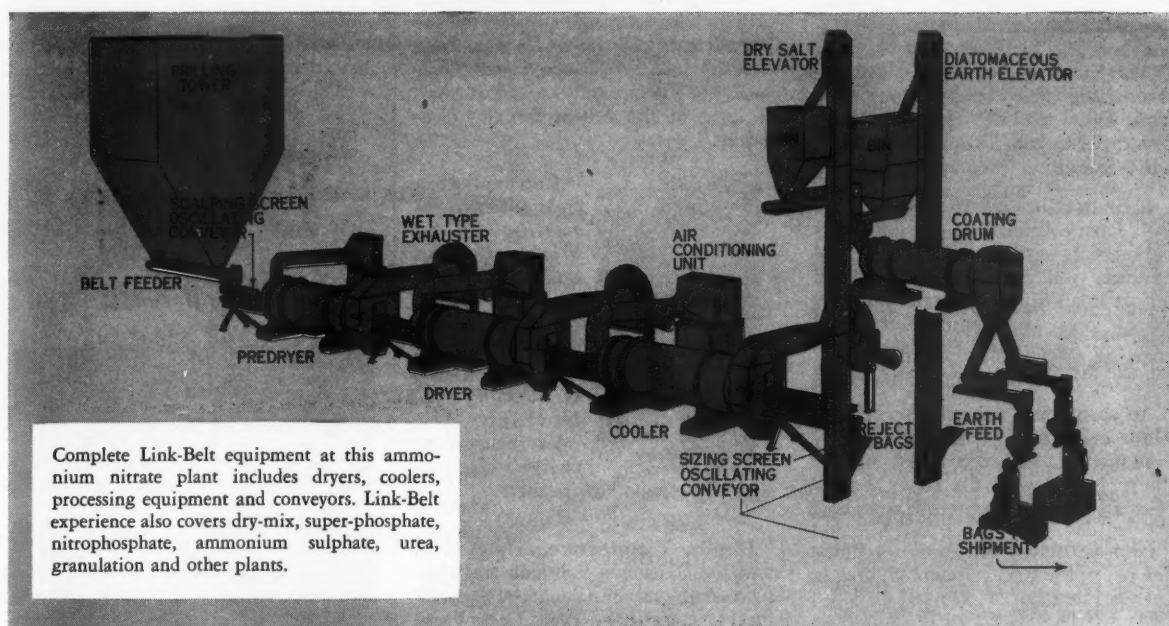
Virginia Carolina's V-C NEWS reports that R. J. Murphy, superintendent, V-C Nichols, Fla. factory, won the Polk county golf championship trophy in competition in October.

R. C. Riley, superintendent of **Virginia-Carolina Chemical corp.**'s Jacksonville, Fla., plant was one of the panel members representing the Chemicals and Fertilizer section at the Second Annual Occupational conference in Jacksonville on Nov. 10. Others of the Jacksonville staff who attended were M. D. Singletary, general foreman, and B. L. Larisey, engineer.

Newly appointed staff consultant in organic chemistry to **Wyandotte Chemicals corp.**'s Research and Development div. is Dr. Lucas P. Kyrides. Prior to joining Wyandotte, he was president and director of research of Sumner Chemical co. and had served as director of the Organic div. of Monsanto Chemical co.

Zonolite co. has appointed Theodore Riedeburg consultant on development and marketing of farm chemicals.

Why Cooperative Farm Chemicals selected LINK-BELT to completely equip its fertilizer plant



Improved methods and Link-Belt equipment assure better fertilizer at lower cost

From prilling towers to bagging machines, the commercial fertilizer plant of Cooperative Farm Chemicals Association at Lawrence, Kansas, is Link-Belt-equipped. This plant chose Link-Belt to gain the advantages of a single quality source for a broad line of materials handling, power transmission and processing machinery, which assures better fertilizer at lower cost.

What's more, Link-Belt offers a unique turn-key service on all types of commercial fertilizer processes. Under a single-contract, Link-Belt accepts complete responsibility for the design, manufacture and erection of entire plants.

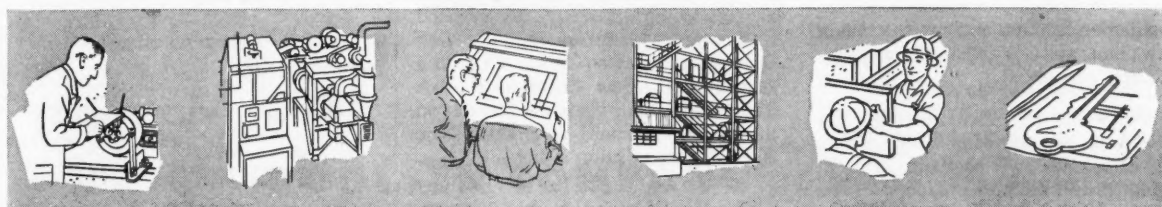
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TESTING STATION

EXPERIENCED
ENGINEERING

QUALITY
EQUIPMENT

SKILLED
ERECTION CREWS

SATISFACTORY
PERFORMANCE

Company Briefs

Charter of incorporation has been granted in Wilmington, N. C. to **Acme Chemicals, Inc.**, with authorized capital stock of \$250,000. Incorporators are Thomas H. Wright, Jr., Margaret T. Wright and C. D. Hogue, Jr.

American Potash & Chemical corp. has announced the removal of its New York office to 99 Park Avenue. Telephone number: OXford 7-0544.

Armour & co.'s Chemical div. address change: from 120 Broadway, New York City, to 2500 83rd St., North Bergen, N. J. Telephone number: LO 4-5955.

A contract has been signed by TVA with **Curry Chemical co.** for distribution of its fertilizer in Colorado. The company will distribute the fertilizer for use in an educational sales program agreed upon by representatives of Colorado Agricultural Extension Service, the distributors and TVA.

An open house was held recently by **Fluor corp.** at its new Research div. headquarters in Whittier, Calif. Among the projects now in the two-acre pilot plant area is a plant for fertilizer studies.

New distributor for **Hercules Powder co.** in the Rocky Mountain area is **Denver Fire Clay co.**, Denver, Colo.

Paul Mayfield, general manager of **Hercules Powder co.**'s Naval Stores dept., recently announced reorganization of the department to provide two assistant general managers and three new divisions.

Arthur Langmeier who has been assistant general manager of Naval Stores since 1952, will be responsible for production and development, while G. Fred Hogg, newly-named assistant general manager, will be responsible for sales under the reorganization plan. The three new divisions and their managers are Agricultural Chemicals div., Richard T. Yates; Pine Chemicals div., H. M. Wendle; Oxychemicals div., Donald H. Sheffield.

More than \$20 million will be spent by **Koppers co., Inc.** in 1955 for enlargement and improvement of present production facilities and construction of new plants and equipment, the company recently announced.

A new company, **Lawson Chemical Products**, recently established at Culver City, Calif., will specialize in packaging pressure-spray products. The firm's address is 5634 Selmaraine Drive.

The Modern Fuel and Ammonia

Service, Inc. has been granted charter of incorporation at Natchez, Miss., listing capitol stock of \$20,000.

A new NH_3 concern, **Mo-Kan Fertilizer co.**, Fort Scott, Kan., began operation in late December with the arrival of its initial order of anhydrous ammonia from Phillips Chemical co. The firm, owned by F. S. Popplewell, has 30,000 gal. storage capacity.

Nitrogen div. has begun distribution of a movie picturing highlights of the Farm Progress Show near Camden, Ind., Oct. 7. Entitled "Modern Soil Builders," the film includes demonstrations of some of the newest farming techniques.



Whinfrey

He is assisted by Harold L. Lindaberry.

Phillips Petroleum co. reports that common Oklahoma Bermuda grass was successfully established at its Agricultural Demonstration Project near Foraker, Okla. under drought conditions.

Shell Chemical corp. has announced that effective Jan. 1, 1955, it is continuing the business formerly conducted by Julius Hyman & co.

The initial run of triple superphosphate fertilizer was expected at the newly remodelled Pocatello plant of **Simplot Fertilizer div.** by mid-January.

The new **Simplot Soilbuilders** warehouse in Meridian was officially opened on Dec. 8, with manager Kent Kehler presiding. Kehler will be assisted by Thaine L. Mitchell.

Sulfur and sulfur rights on some 500 acres in the Allen Dome area of Brazoria county, Tex., have been acquired by **Standard Sulphur co.** from Gulf Oil corp. and Brazos Oil and Gas co., a subsidiary of Dow Chemical co. A \$1.5 million sulfur plant will be built on the site by Standard to produce some 200 long tons of sulfur a day.

Stauffer Chemical co. has just completed a new \$800,000 plant for manufacture of Crystex at Monongahela, Pa.

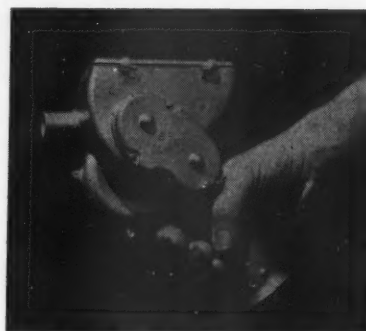
Distributors

Wanted!

for IMPORTED

Spit Duster

—an all year-round item



- CAPACITY:** 5¼ ozs. equal to 7 minutes of dusting
- DISTANCE:** Dust will reach 12 feet without wind
- WEIGHT:** 1½ lbs.
- OPERATION:** The only duster which can be operated with one hand, leaving the other hand free to move foliage or to hold plants.

FOR HOME GARDENERS, NURSERIES, Etc.

Seeking distributors only.
No direct sales.
Many territories open.

Write promptly:

Raw Materials Trading Co.

7 E. 44th Street
New York 17, N. Y.
Phone: MUrray Hill 2-8535

FARM CHEMICALS

The installations were designed and constructed by Stauffer's Engineering dept.

The operation is based on continuous flow, converting ordinary rhombic sulfur to the allotropic form, which is radically different in its chemical and physical properties. Stauffer's process involves rapid chilling of molten sulfur in carbon disulfide with the separation of insoluble polymerized allotropic sulfur, estimated to have a molecular weight of several hundred thousand.

The Cleveland, O., offices of Union Carbide & Carbon corp. have been consolidated in a new office building and distributing center at 1300 Lakeside avenue.

Much of Virginia-Carolina Chemical corp.'s 1955 advertising program is built around the fact that the year marks its 60th anniversary, the company reported in its V-C News. Full page, four-color ads point up business relations between V-C, dealers and agents. Copy points to length of dealer service, a sound endorsement for V-C fertilizers.

Contract to engineer and construct a 60-ton per day anhydrous ammonia plant for Westvaco Chlor-Alkali div., Food Machinery & Chemical corp. has been awarded to The Lummus co. Engineering already is underway for the plant, to be located at South Charleston, W. Va.

CHEMICALS

New Aldrin-Dieldrin Rules

A relaxation in the poison classification for aldrin and dieldrin products and in warning and cautionary statements required on the labels has been approved by USDA's Pesticides Regulation section, Shell Chemical corp. reports.

Products containing 10 per cent through 59 per cent aldrin or dieldrin, which include most ready-to-use formulations, now are placed in a lower hazard category. The "Skull and Crossbones," "Poison," "Antidote" and "Call a Physician Immediately" designations and directions on the labels are no longer required. Another relaxation is the substitution of "Hazardous" in the warning statement for "Poisonous."

Formulations below 10 per cent can now be labeled with even milder statements; i.e., "Warning" is replaced by "Caution."

Poison designations and antidote statements must still be carried on formulations containing 60 per cent or more of aldrin and dieldrin.

Shell Weed Seed Killer

A new weed seed killer, developed by Shell Chemical corp., has just been placed on the market for use in tobacco seed beds.

Named Shell A-A Weed Seed Killer it acts as a contact herbicide for control of weed and grass seed in the tobacco seed bed. Applied as a drench, using 6 quarts in 100 gallons of water for each 100 square yards of seed bed, it penetrates the seed coat, especially small seeded grasses and weeds.

Shell says the herbicide is equally effective for control of weeds in nursery, vegetable and other seed beds.

New Form for Panogen

Panogen, the red liquid seed disinfectant for cereal grains, is being marketed in a new form for use in slurry seed treaters.

Called Panogen 42, it is a concentrated liquid which must be diluted before using. Otherwise, the company reports, it is identical with the ready-to-use "Panogen and is equally effective for disease control of wheat, oats, flax, barley, rye, cotton and sorghum.

Grain-Gard Protectant

Grain-Gard, stored a grain protectant, has been introduced by Cornell Chemical & Equipment co., Inc. Designed for all types of grain, including seed and grain that will be milled for human consumption, the product is non-toxic, non-flammable, economical and long lasting, states Cornell.

Have you these Insecticide production problems?

- Increasing per hour production
- Improving product quality
- Reducing labor costs



Solve them with R.T.R. UNI-BLENDER Compounding Plants

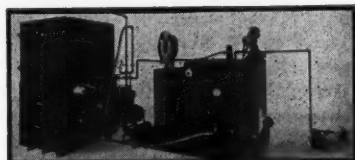
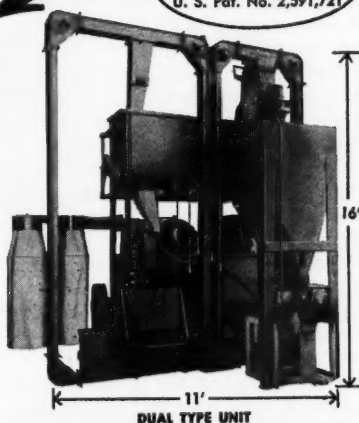
These complete, compact Ready-to-Run units provide maximum production per hour—uniform quality products—at minimum labor and other operation costs.

The Dual type plant elevates, mixes, pulverizes, blends, and packages dust concentrates and also field strength dusts, including those involving liquid impregnation. Jacketed mixers if specified.

Stock models now available in 40, 56, 70 and 100 cu. ft. mixer capacities. Other compounding and liquid formulating plants engineered to your specifications.



Write for technical bulletins



R.T.R. Uni-Blender Liquid Formulating Plants liquefy and blend toxicants used in production of liquid concentrates and liquid sprays.

POULSEN COMPANY

Engineers and manufacturers of materials processing and materials handling equipment

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Associations & Meetings

Safety Committee Meeting

CHAIRMAN Tom Clarke presided at a meeting of the Executive committee, Fertilizer section, National Safety Council, held on December 7 in Memphis, Tenn. Clarke was given a vote of confidence by the group on his work with the section's News Letter and he announced that Billy Creel, North Carolina dept. of Labor would serve as co-editor for the next year.

Work is continuing on five data sheets, reported A. B. Pettit, involving as subjects: Blasting (Curtis Cox), Ammoniated Solutions (John Smith), Storage and Handling of Materials (George Dietz), Use of Sulfuric Acid in Fertilizer Plants (John Rozel) and Instruction Cards (Adolph Ecklund).

In a study on mixing pesticides with fertilizer, Pettit stated that E. J. Largent and Dr. James P. Hughes needed assistance of an engineer familiar with the fertilizer industry.

The question of definite figures showing results obtained through efforts of the section was raised by Paul Truitt, APFC president. Using comparative

figures from the 1952 and 1953 contests it was shown that accident frequency was 18.93 and 14.25 respectively and that severity was 3.44 and 2.00, a definite improvement in 1953 over the previous year.

J. C. Kato was officially presented as the new council staff representative for the section and, reporting on the Motivation Study being conducted by the section, Kato stated that contributions were \$110 short of the \$2,500 originally requested.

Other subjects discussed by the group were inclusion of underground mining such as in the potash industry in the safety contest, basis of statistical comparisons in safety work and efforts made to secure additional members.

The resignation of Allen Brent, Southern, Fert. & Chem. co. from the committee was announced.

Meetings were held in the conference room of the Spencer Chemical co. and the committee members were guests of the company at a luncheon in the Tennessee Club.

MWSIC Sponsors Joint Agronomist-Industry Meet

Round table discussions of more efficient, cost-cutting methods of producing corn, small grains and legume grass crops and reports on the latest results of fertilizer research will be highlights of the joint meeting of Midwestern agronomists and fertilizer industry representatives on Feb. 17-18 at the Palmer House in Chicago.

Sponsored by the Middle West Soil Improvement Committee, the meeting will open on Feb. 17 with a welcome to the soils men and visitors by H. S. Vorhes, MWSIC president.

Speakers scheduled to address the group on the 17th include John MacGregor, University of Minnesota and A. J. Attoe, University of Wisconsin; John R. Webb, Iowa State College; Richard Swenson, Michigan State College; John Falloon, University of Missouri; M. B. Russell, University of Illinois and Russell Coleman, National Fertilizer Association president.

Two panels have been planned for the 18th—one on efficient corn production and the other on efficient wheat production. Paul Burson, University of Minnesota, will present the agronomists' suggestions for recommended fertilizer grades and ratios in the coming year.

Coop Fert Panel

A discussion of farm chemical problems was included in the program of the

26th annual meeting of the National Council of Farmer Cooperatives, held in Chicago Jan. 5-8.

Highlight of this session, reports A. M. Eno, manager of GLF Soil Building Service's Fertilizer dept. and chairman of the fertilizer session, was a panel on the granulation of fertilizer. Participating in the panel were Dr. Jos. Chucka, Eastern States Farmers Exchange; E. J. Smith, Coop. G.L.F. Exchange; Arthur Mullin, Indiana Farm Bureau Coop. Association and Ray Pavlak, Wisconsin Farmco Service Coop.

Several cooperatives now are manufacturing granular fertilizers, stated Eno and others are converting existing plants or building new ones which include granulation equipment.

Also included on the program was a summary of the new pesticide tolerance legislation, presented by Ed Georgi of United Cooperatives of Alliance, O.; a study on the economics of complete liquid fertilizer by Arthur Fahrenkrog of Illinois Farm Supply co.; description of a method of incorporating anhydrous ammonia in mixed fertilizers by Clifford Kindschi of Wisconsin Farmco Service and an outline of methods used to strengthen early season fertilizer shipments by Merle Blue of Consumers Cooperatives Association of Kansas City. Walter Horn, of Missouri Farmers Association, described operation of the organization's new plant at Joplin, Mo., for manufacture of ammonium phosphate.

Luncheon Meeting for

S. C. Entomologists

SOUTH CAROLINA entomologists representing all branches of the profession met at a luncheon meeting in the Jefferson hotel, Columbia, on Dec. 17. In addition to serving as a social get-together for approximately 50 entomologists present, the meeting included a program centered around the Centennial of Professional Entomology theme, reports David Dunavan, centennial coordinator for South Carolina.

Dr. M. D. Farrar, dean of agriculture of Clemson Agricultural College and an entomologist by profession, keynoted the meeting with an address entitled, "Professional Entomology, Past, Present and Future."

Entomologists from the main experiment station at Clemson and from three branch stations reported briefly on historical aspects of investigations of early insect problems and personnel involved.

Representatives of the South Carolina Extension Service and the State Crop Pest Commission outlined early work, especially that concerned with the invasion of the state by such pests as the boll weevil, Mexican bean beetle and other pests. The Public Health and other Federal agencies also presented historical summaries of early work with insects affecting human welfare. Attention during the program was also given to reports on some of the more recent developments in entomological work.

Steps were taken at the Dec. 17 meeting toward organization of a South Carolina Entomological Society.

Colo. Ag Chem Group

The annual meeting of the Colorado Agricultural Chemicals Association was held on Friday, Jan. 28 at the Cosmopolitan hotel in Denver.

Publicity Committee Chairman J. Newton Hall reported that main activity at the meeting was to be reports of the state and industry committee chairman on proposed changes in agricultural chemicals recommendations for the ensuing season and discussions thereon.

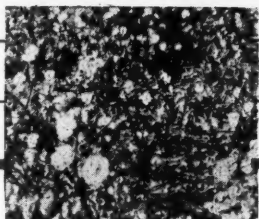
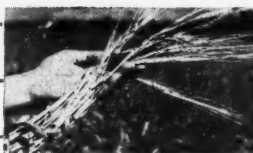
GPFS Annual Meeting

The annual meeting and banquet of the Georgia Plant Food Educational Society was held on Tuesday, Jan. 18 in Athens, Ga.

Pest Control Conferences

Regional pest control operators' conferences were conducted Jan. 31-Feb. 4 at Purdue University, West Lafayette, Ind.; Jan. 31-Feb. 2 at Louisiana State University, Baton Rouge and Feb. 3-5 at the University of Massachusetts, Amherst.

NITROLIME



NON-ACID FORMING



A BETTER NITROGEN SOURCE FOR BETTER CROP PRODUCTION

A balanced nitrogen plant food, NITROLIME offers the best assurance of maximum production with all types of crops. The exclusive NITROLIME formula combines in equal proportions the fast acting nitrate nitrogen with the more slowly reacting ammonium nitrate for superior results.

NITROLIME comes in free-flowing granular form for the easier distribution and better storage stability for longer periods.

In every respect, NITROLIME is the most effective form of nitrogen for all crops. The Bradley & Baker Sales Service Staff will be glad to give you full information on NITROLIME and other basic plant foods without obligation.

GUARANTEED ANALYSIS

TOTAL NITROGEN	20.5%
NITRATE NITROGEN	10.25%
AMMONIA NITROGEN	10.25%



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DISTRICT SALES OFFICES:

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Exclusive Agents in the United States for Centraal Stikstoff Verkoopkantoor, N. V., The Hague, Holland

Equipment & Supplies

Completely New HA Payloader (RS 77)

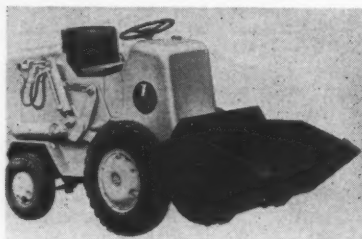


After three years of development, refinement and field testing, a completely new and different model HA Payloader was introduced in February by The Frank G. Hough co., the company recently announced.

HA has twice as much carrying capacity, more than twice as much lifting and digging capacity, from 50 to 100 per cent more productive capacity, states Hough, without increasing width, height and wheelbase. The bucket has been increased $16\frac{2}{3}$ per cent, giving the new HA a payload capacity of 18 cubic feet and a struck-load capacity of 14 cubic feet.

In spite of all these increases, Hough says its new payloader is a more maneuverable machine with a shorter turning radius than the former model and can be operated into and out of box cars with ease.

An entirely different bucket arm design permits exceptional breakout action of the bucket and 40 degrees of tipback,



and also makes it possible to carry heaped loads at a lower level, thus providing greater stability and better operator vision.

New standards of operator safety and ease of operation result from a combination of the new bucket arm design, which keeps the arms below the operator's level, and a hydraulic accumulator which minimizes load shocks and stabilizes the hydraulic controls.

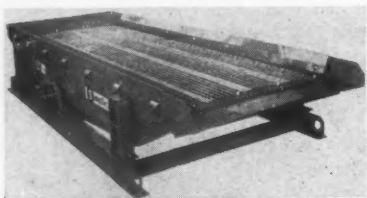
Torque converter drive and full-reversing transmission are combined to assure fast operating cycles and ease of operation. A sealed and pressurized hydraulic system has been incorporated and double-acting rams operate the boom-arms and the bucket.

Also improved is the ease of accessibility of all service points. Other new features include improved steering, new solenoid starting controls, new ignition lock, dustproof distributor, improved bucket construction, hose connectors, sealed grease fittings, new pin lock design, improved ground clearance, increased drawbar pull, and a new parking break.

Complete information and literature can be secured if you circle 77 on the Reader Service card.

Simplicity "C" Screen (RS 78)

Simplicity Engineering co.'s 3' x 8' Model "C" gyrating screen is light, compact and provides a full 24 square feet of screening surface, the company reports. The screen's completely bal-



anced assembly concentrates the vibration to the deck area with little or no vibration transmitted to the main frame, plant floor or supporting structure.

Tapered at the discharge end so it will easily fit existing conveyors, the unit is manufactured either with stainless steel screen cloth or with a mild steel deck and spring steel screen cloth.

For more information on the Model "C," circle 78 on Reader Service card.

Bemis "Mr. Little" Sleeve

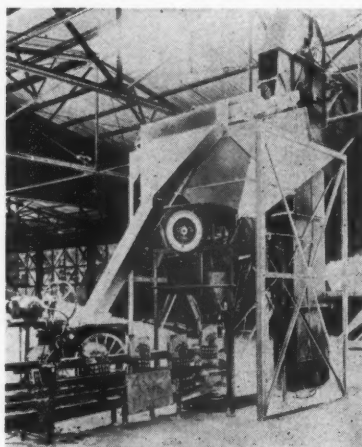
A newly designed inner sleeve valve for multiwall paper fertilizer bags is being introduced by Bemis Bro. Bag co. Named for its inventors, the "Mr. Little" sleeve valve practically eliminates leakage and gives maximum sifting protection, reports Bemis.

It functions in much the same manner as a check valve in a water pipe, which permits the water to flow freely in one direction but not in the other.

New I & C Bagger (RS 79)

A new, high speed I & C Bagger, Model UB-101, has been placed on the market by Union Bag & Paper corp., sales agents for Inglett & Corley equipment. This new model works in conjunction with a moving conveyor and sewing head with a completely automatic weighing and filling cycle.

Here's how it works: The operator pushes a starter button, pre-weighed material is automatically delivered through



the bag chute in an endless series, the filled weight drops each open mouth multiwall onto a moving belt which leads them through the sewing head.

Other advantages include double-face dial scale and a new switch system which enables operator to change weight units by operating the proper switch. Products can be check weighed in the same way.

For full information circle 79 on Reader Service card.

Spit Duster (RS 80)

Raw Materials Trading co. is now offering, through distributors, an ingenious Spit Duster which can be operated with only one hand.

The unit holds $5\frac{1}{4}$ ounces of material, equal to seven minutes of operation, and can project formulations a distance of 12 feet. It weighs only $5\frac{1}{4}$ pounds.

Companies interested in acting as distributors for this new device can obtain details by circling 80 on the Service Card.

Neoprene W Coating

Carboline co. has added Neoprene W to its line of corrosion resisting protective coatings. Recommended for maximum maintenance protection against most acid and alkali fumes and splash and high humidity, Neoprene W shows excellent resistance to abrasion and weathering, according to Carboline, and is simple to apply.

FARM CHEMICALS

For information on numbered items use the Reader Service Card

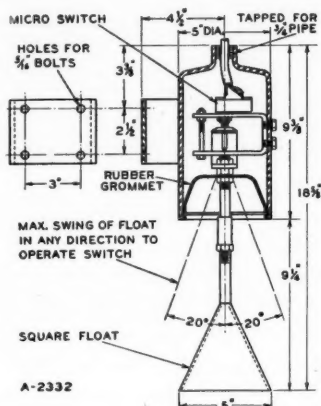
Social Security Guide

The FARMER'S SOCIAL SECURITY GUIDE, recently published by Service Publishing co., is a complete, yet concise explanation of the many new Social Security benefits voted to farmers by the last session of Congress.

Sold at 50 cents per single copy, the 28-page guide is available in lots of 100 or more copies at quantity discounts to manufacturers and dealers selling the farm market. Further information is available from Service Publishing co., 210 Benedum Trees Building, Pittsburgh 22, Pa.

Improved S/A Tellevel (RS 81)

Stephens-Adamson Manufacturing co. now is marketing an improved heavy duty "Tellevel" bin level control. Major changes include a redesign of switch housing and deflector mechanism to further reduce any possibility of sticky material building up on the unit. The pendant steel cone deflector has been replaced by a steel pyramid, and the switch housing now is a one piece



unit of spun steel tapped at one end for electrical conduit and sealed at the other end by a molded rubber grommet.

Standard Duty and Explosion Proof Tellevels are also available for lighter service with small lump, granular and powdered materials.

For details on application and installation, circle 81 on the Reader Service card.

Y & T Warehouse

Lifting two standard 55 gallon drums and the operator as high as 165 inches is now possible with a 1,500 pound capacity Warehouse, reports the producer, Yale & Towne Manufacturing co.

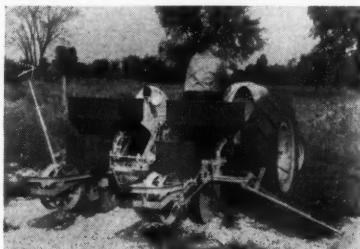
Built by Yale for American Can co.'s Baltimore, Md., plant, the Warehouse's drum handling platform is 48 inches long and 61½ inches wide. Center depression is 37½ inches wide, allowing a 12 inch walkway on each side for the

operator who rides up with the platform to put drums in or out of storage. The platform can be removed to permit standard fork truck operation.

Hi-Yield Applicator (RS 82)

Working in cooperation with soil and fertilizer experts at Michigan State College, Farmcraft Manufacturing co. is producing a unit called the Hi-Yield, a two-level fertilizer applicator and planter.

The new unit places two bands of fertilizer in the ground, one 8 inches



down and the other, 4 inches down. Seeds are placed 2 inches to one side of the shallow band below the ground surface and seed depth is adjustable from about 1 to 2 inches.

Two different analyses can be laid down simultaneously, and divided seed hoppers also make interplanting possible, states Farmcraft. The Hi-Yield

will do drill or hill drop planting by simple interchange of metering plates in the hoppers. In addition, the unit can be adapted to liquid fertilizers.

For further information on performance and availability, circle 82 on the Reader Service card.

Bemis Welded Bag Seam

Perfection of a welded side seam, possessing unusual strength and uniformity, for polyethylene bags, has been announced by Bemis Bro. Bag co. This Fine-Weld construction, states Bemis, produces a thin, beaded seam which is actually stronger than the polyethylene film itself.

In forming the seam, polyethylene edges are heated to a point where they will fuse together and build up to several times the thickness of the original film.

Stand-Up Lift Truck

A new electric stand-up hydraulic lift truck has been announced by Yale & Towne Manufacturing co. Called the K-46 model, the truck is available in 2,000, 3,000 and 4,000 pound capacities. It has a top speed with full load of 4½ to 5 miles per hour, will carry the load up a 10 per cent grade and has a lifting speed with full load of from 37 to 40 feet per minute.

Suppliers' News

Beckman Instruments, Inc. has announced a new field engineering activity designed to assist process industries in the problems of applying analytical instrumentation. Nine of the company's field engineers have now completed advanced training and have been assigned to major industrial centers.

Chain Belt co. recently opened a new plant, warehouse and sales office at 7601 Telegraph Road, Los Angeles, Calif.

The Foreign Operations Administration has issued an FOA convertibility insurance contract totalling \$479,250 to Clark Equipment co. to cover receipts on the company's investment in capital stock of the French transportation equipment firm Les Ateliers de Strasbourg.

D. R. Daniels, Inc. has greatly increased the production scope in its Daniels, Md., and Weldon, N. C., mills and factories.

St. Regis Paper co. is reported planning a new growth program to double its earnings by 1956 or 1957. Included is an additional \$40 million investment at its Jacksonville and Tacoma plants, possibly late this year.

The Mid-Atlantic district of St. Regis Paper co.'s Multiwall Packaging div. was consolidated into the Eastern district on Jan. 1, with Howard C. Peterson, Jr., St. Regis Sales vice president, in charge. H. Stanley Hangen, who retired Dec. 31 as vice president of St. Regis Sales corp., has been in charge of the Mid-Atlantic district.

Other appointments in the Eastern district include those of Lauren E. Gjovig as manager of engineering; Elmer E. Wilke as manager of field engineers and G. W. Leopold as manager of the materials testing laboratory at Allentown, Pa.

Underwriters' Laboratories approval on Yale LP Gas or propane powered industrial lift trucks from 3,000 to 10,000 pound capacity has been announced by Yale & Towne Manufacturing co.

The Detroit sales office of Robertshaw-Fulton Controls co. has been moved from 2680 West Grand Boulevard to 8406 West McNichols Road.



Three of the A.A.C. Co's electrically-operated draglines at work at our phosphate mines in Central Florida. Bucket capacities range from $9\frac{1}{2}$ to 17 cubic yards. The 17-yard draglines with their 175-foot booms each weigh more than a million and a half pounds and can move 35,000 tons of material in 24 hours. From these rock deposits flow a continuous stream of high quality phosphate rock, assuring a dependable source of supply of AA QUALITY phosphorus products, see list below.



AA Quality...

for over 85 years a symbol of quality and reliability

principal AA QUALITY products

All grades of Florida Pebble Phosphate Rock

AA QUALITY Ground Phosphate Rock

All grades of Complete Fertilizers Superphosphate

Gelatin Bone Products Salt Cake Ammonium Carbonate

Sulphuric Acid Fluosilicates Insecticides and Fungicides

Phosphoric Acid and Phosphates

Phosphorus and Compounds of Phosphorus



From the air—wet rock storage and drying plant, with dry rock storage silos in background. These silos, 29 in number, have a total capacity of 40,000 tons of dried rock. Under the silos are four runways where 40 railroad cars can be loaded at a time.

THE AMERICAN AGRICULTURAL CHEMICAL COMPANY

GENERAL OFFICE: 50 CHURCH STREET, NEW YORK 7, N. Y.

30 FACTORIES AND SALES OFFICES, SERVING U. S., CANADA AND CUBA—ASSURE DEPENDABLE SERVICE

Washington Report

By Fred Bailey & John Harms

There's one thing businessmen can be sure of about Washington in 1955: Administrative and legislative actions taken this year are almost certain to be middle-of-the road . . . moderate. There will neither be strong shifts to the left nor to the right. The Democratic-controlled 84th Congress is not likely to veer away from Administration thinking in most important domestic issues. Legislation, controlled by the Democrats, will be managed by "moderates"—a coalition of conservative Democrats and liberal Republicans.

The President's budget message to Congress indicates few broad changes in the offing of which you should be aware—pertaining to your operations. Generally, Congress can be expected to go in the direction advocated by Eisenhower. One big exception, however, is the future of the Tennessee Valley Authority. The President advocates a 90 per cent cut in TVA funds for fiscal 1956. Democrats in Congress indicate they won't go along.

In addition to spelling out government intentions for the year beginning July 1, the budget message indicates the official view of the economy for the next year and a half. Interpreting the maze of figures, you come up with this view: Employment will be higher, incomes will be up, business profits will improve, interest rates to be relatively low.

Government spending in agriculture for the new fiscal year is to be down about one billion dollars. Net Agriculture budget is proposed at \$2.3 billion for the 1956 fiscal year, compared with \$3.1 billion in the current year. The reduction is mainly due to small anticipated price support programs.

Among the recommendations made by the President for the Agriculture department are: (1) An increase of \$9 million for all research activities; (2) a \$6-million boost for extension (farmer education) programs, most of which is in payments to state colleges; (3) A \$4-million increase for conservation in small watersheds; (4) an authorization of \$175 million to be spent in making conservation (ACP) payments. (ACP money now is \$250 million. The change will be hotly contested by farm state lawmakers.)

Proposed legislation of interest to the industry includes:

Federal regulation on interstate shipment of fertilizers, by Rep. Usher Burdick (R., N. D.). This comes up regularly . . . has little chance for more success now.

Cotton acreage allotment increase to 19.5 million acres for 1955. That would be a 1.4 million-acre increase over the level already proclaimed by Secretary Benson for this year and accepted by cotton growers in a recent crop-wide referendum. Powerful backing, but less than 50-50 chance.

Sever the tie-up of ACP payments with crop controls. The 1954 farm law bans ACP payments to farmers who plant more than acre allotments call for. A score of bills on this . . . USDA is said to approve . . . chances very good.

Aid to drought-stricken, and "small" farmers. Easier credit and other help for drought areas . . . easier credit and technical training for the smalls (including helping some find other jobs.) An Administration proposal backed up with strong congressional favor.

Regulation of chemical additives to foods. Bills to be submitted by Rep. Delaney (D., N. Y.), and Rep. Miller (R., Neb.). New Miller offering is expected to be patterned after the Miller pesticide bill, with a provision for pre-testing of chemical additives before use in food and an independent advisory committee.

Grain sanitation program has been started again by the Government. Secretary Hobby of the Department of Health, Education and Welfare, has directed the Food and Drug Administration to start sampling carloads of wheat travelling interstate—and “to institute legal action under the Federal pure food law against lots of wheat contaminated by rodents or damaged by insects.”

The sanitation crack-down was scheduled to begin in the spring of 1953, but was put off until now because of pressure from the grain industry. The order to get started again was kept as quiet as possible—presumably to circumvent consumer reaction against the present level of contamination.

Wheat lots will be seized if samples show they contain more than 5.4 rodent pellets per 1000 grams of grain and/or more than 2 per cent insect damaged kernels. It is estimated that about 4 per cent of the wheat crop might be subject to seizure in the FDA enforcement of these standards.

As the FDA clean-up campaign gains more publicity through seizures, you can look for agitation on the part of segments of the grain and flour industries to demand cleaner grain on all levels. Use of pesticides and sprays is one of chief methods for keeping stored grain pure.

The battle of farm price supports, 1955 version, has started with the outcome in doubt. Washington dopesters are betting the Administration's flexible support program will stick. If so, here's one analysis of what it means to the chemical industry:

When the support formula goes on full flexibility in 1956—meaning a range between 90 and 75 per cent of parity—farm income from specific crops will fluctuate more widely from year to year. This would be especially true of heavily-fertilized crops of cotton and wheat. Prices and income would be geared more closely to supply and demand—rather than to support levels. The outlook would be for a cycle of big supplies and lower prices one year, followed by a year of short supplies and higher prices, followed by big supplies and lower prices and so on.

This means that industries supplying agriculture will find it necessary to follow market and commodity supply trends more closely, for price support levels . . . which tend to even out peaks and valleys in annual price and income changes . . . will mean progressively less to farm markets. Only significant support change in 1955 is on wheat . . . reduced to 82½ per cent of parity. Big changes won't come for cotton, corn, rice and peanuts until 1956. Tobacco is unaffected by the changes.

“Once-over” pesticide treatment of corn soils is an innovation to be watched . . . and encouraged . . . in the Corn Belt. It's being recommended by several of the Land Grant Colleges, including Iowa State, to reduce insect infestations which cut production by as much as 15 per cent.

Tests show that about a 2-pound per-acre broadcast application on first year corn out of the sod can control such corn pests as cut worms, wire worms, white grubs and seed corn beetle. A sufficient quantity of chemical remains in the soil for second-year control of rootworm. The college experts believe that in the third year of rotation, enough chemical is left to improve the odds for a good legume crop.

Trend toward bulk spreading of fertilizer is on the upswing in several Midwest states, such as Minnesota, Missouri, Iowa and some others. Farmers figure it's more economical to spread fertilizer by hired truck over their fields, than buying bagged plant food and spreading it themselves. Field predictions are this method will gain in popularity in areas where trucks can go onto fields with little difficulty. In eastern areas, where fields generally are wetter, this method is not expected to hold much promise.

There's little indication that county agents will recommend reduced fertilizer applications in most drought areas, as seemed a possibility earlier. Government crop experts figure that this year may be an exceptionally good one to recommend heavy fertilization.

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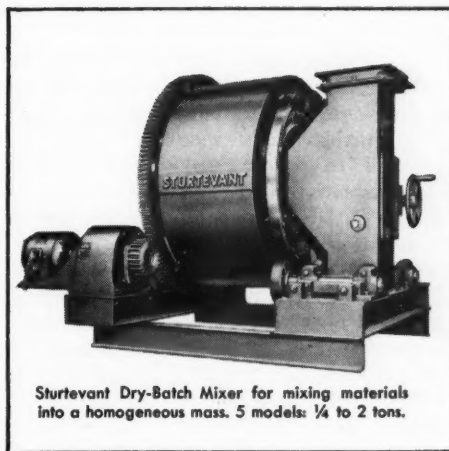
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Pesticide Tolerances

Go Into Effect Soon

By John Harms

WATCH for regulations and tolerances governing residues of pesticides used on fruits and vegetables to be made effective before long. Based on the quantity and type of industry comment and suggestion on the proposals, they are expected to go into effect about as-is with changes limited mainly to clarification.

Industry reaction to the proposal made by the Department of Health, Education & Welfare on Oct. 20, 1954, is regarded here as being generally favorable. Deadline for comment and suggestion was Dec. 20. Chief line of criticism from manufacturers was that evidence since the hearings four years ago—on which most of the tolerances are based—indicates that additional commodities should have been added to the list on which tolerances for specified chemicals will be permitted.

Chemical companies which filed comments and suggestions are American Cyanamid co., Dow Chemical co., E. I. du Pont de Nemours, Geigy Chemical corp., Rohm & Haas, Shell Chemical corp., Velsicol corp. (division of Arvey corp.) and Virginia-Carolina Chemical corp. Also commenting were the Agricultural Experiment Station at the University of Florida and, of course, the National Agricultural Chemicals Association.

Suggestions from NAC Association

NAC, after an intensive study of the tolerances and regulations, came up with these suggestions:

1. Further study should be made of fees to be charged to cover Food & Drug Administration's administrative costs. NAC didn't criticize the \$500 fee for an initial tolerance application, but did object to a similar fee for amendment or repeal of a tolerance, and to the \$500 charge for temporary tolerances.

2. Exception was made to a provision in the regulations which provides that where residues of two or more pesticidal chemicals of the same class are present on a commodity, the total residue shall be considered to have the tolerance of the chemical having the lowest numerical tolerance within the class. NAC recommended that only in cases where the residue chemicals cannot be identified should they be considered to have the same tolerance as the chemical with the lowest numerical tolerance in the class.

3. Clarification is needed of regulation provisions making clear that tolerances allowed apply to the

economic poison itself—not to formulations or finished products.

4. Make certain that FDA accepts and files any petition if the petitioner insists. NAC says that the law is based on the concept that a petitioner has a right to have submitted data evaluated and a tolerance provided on the basis of these data, even if it is only a zero tolerance.

5. Permit a petition for a tolerance to be accepted by FDA for filing without a sample of the pesticide until later, if the FDA asks for one.

6. Require that the pesticide branch notify a petitioner of acceptance or non-acceptance within 15 days after receipt of a petition.

Manufacturers Objections, Suggestions

Manufacturers' objections and suggestions included:

Dow Chemical co., Midland, Mich., said there was confusion over regulations concerning the chemistry and nomenclature of dinitro, or DN compounds. For one thing, Dow pointed out that the compound dicyclo-hexyl-amine salt of dinitro-o-hexylphenol was listed wrongly as a miticide. Dow requested that both dinitro-o-cyclohexyl-phenol and the dicyclo-hexylamine salt of dinitro-o-cyclohexyl-phenol be included and provided a tolerance of one part per million on citrus.

American Cyanamid co., New York, asked that the order make clear that tolerances set for citrus crops apply to citrus generally and not to a limited few. American Cyanamid also called for broadening of permitted use for parathion at the rate of one part per million on certain products besides those already listed in the order.

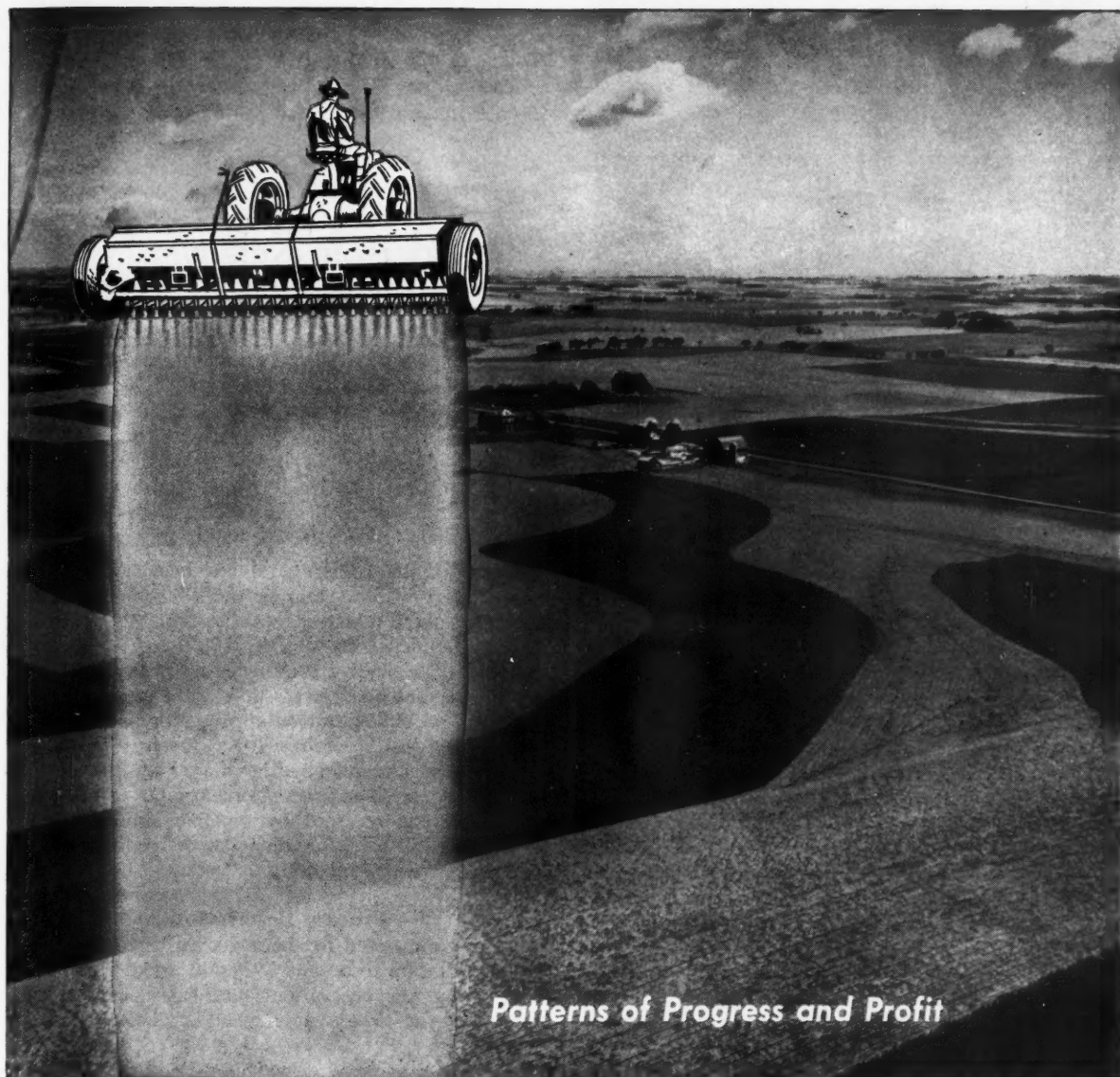
Geigy Chemical corp., New York, also asked for a broader definition of citrus crops and took exception to failure to set up tolerances for DDT on certain specific vegetable crops.

Shell Chemical corp., and its subsidiary, **Julius Hyman & co.**, Denver, said the definition of aldrin and dieldrin would lead to confusion. In addition, they asked that tolerances for these be set at zero so that producers could petition for new tolerances under the Miller bill amendments and submit new evidence on a wider range of fruits and vegetables not now covered in the proposed order.

Velsicol corp., took exception to findings on chlordane. The company said the proposed tolerances failed to include some fruits and vegetables for which chlordane had been recommended, also that the proposed tolerance of one part per million was too restrictive.

Virginia-Carolina Chemical corp., Richmond, opposed banning of any residue of nicotine and nicotine-content materials on fruits and vegetables. Under normal practices, the company stated, the amount of water-soluble nicotine left on produce at the time of harvest is insufficient to constitute a hazard to consumers.

Rohm & Haas co., Philadelphia, objected to omission of tolerances for zinc ethylene bisdithiocarbamate (Zineb) and diclorodiphenyldichloroethane (DDD-TDE) on specific fruits and vegetables. For certain commodities, the firm asked for tolerances of seven parts per million for these chemicals. ♦



Patterns of Progress and Profit

(Photo — Courtesy Soil Conservation Service, U. S. D. A.)

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FEBRUARY, 1955

31

Grace Plant Dedicated



Unveiling of a dedicatory plaque by Assistant Secretary of Commerce Samuel W. Anderson (right). Also shown are Frank Ahlgren, editor of the "Memphis Commercial Appeal," and John G. Carriere, Grace's Memphis plant mgr.

GOVERNMENT and industry leaders met at Woodstock, near Memphis, Tenn., on Jan. 6 to participate in dedication of the new Grace Chemical co. nitrogen plant. The \$20 million operation is the first manufacturing unit of Grace Chemical and began turning out ammonia last Dec. 21. Swift's Plant Food div. received the first tankcar load of anhydrous.

Rated capacity of the ammonia-urea plant is 250 tons of ammonia per day of which 100 tons daily can be converted into 150 tons of urea. It is expected that rated capacity will be reached or exceeded early this year.

Samuel W. Anderson, assistant secretary of commerce, was principal speaker at the dedication ceremonies and, in the evening, Senator Estes Kefauver

Anderson, Kefauver
Speak at Ceremonies.
Facilities Described

addressed those attending a dinner held at the Memphis Country Club. During the afternoon John G. Carriere, plant manager, was host on a conducted tour of the facilities.

Foster Wheeler corp. designed and built the unit using three licensed processes:

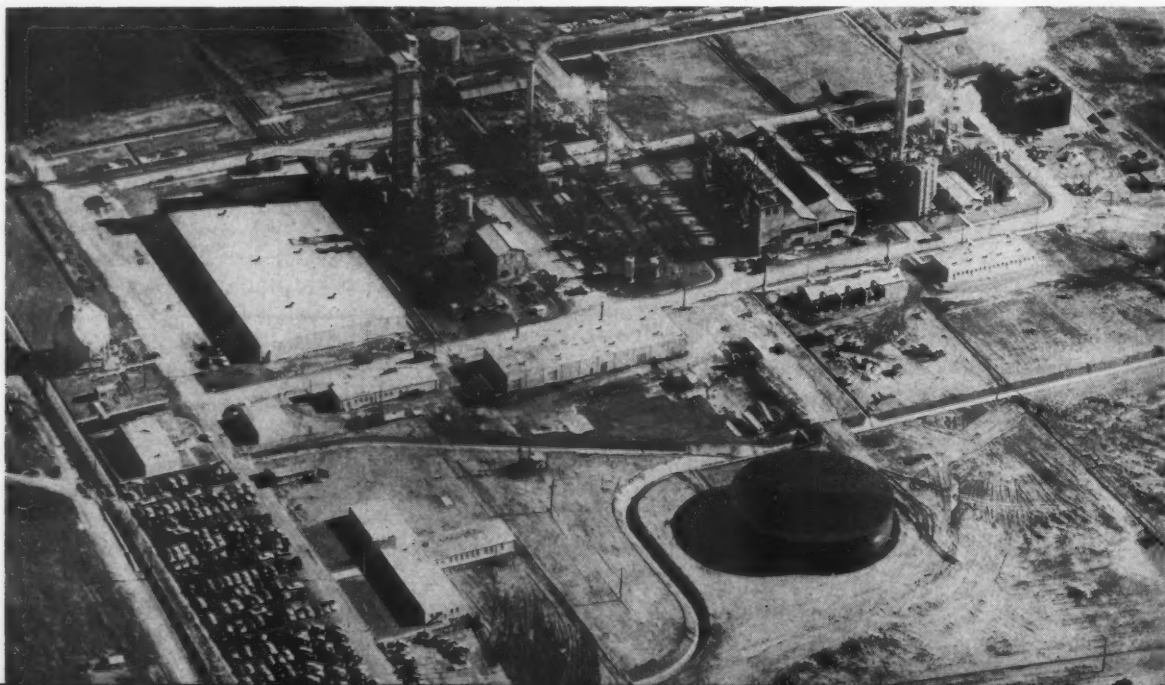
- Texaco partial oxidation, for production of ammonia synthesis gas;
- Casale, for ammonia synthesis;
- Pechiney, for urea production.

Natural gas received by pipeline and consisting principally of methane along with air and water constitute the raw materials.

Process Description

Air is compressed to about 600 psi, scrubbed with caustic solution to remove CO_2 and dried. It is then sent to an air separation plant, designed by Air Products, Inc. where it is colled until liquefied and

Aerial view of the new \$20 million anhydrous ammonia-urea Grace Chemical plant located at Woodstock, Tenn.



separated by distillation into N_2 and O_2 .

Oxygen is mixed with compressed natural gas in the Texaco units where the gas is partially burned to form a synthesis gas composed of hydrogen and carbon monoxide. Temperature and pressure in these units exceed 2000 F and 300 psi.

This gas is quenched with water to reduce the temperature and mixed with steam in shift converters. In these catalyst-containing units, the carbon monoxide is "shifted" to carbon dioxide. The CO_2 is removed from the gas stream by absorption in monoethanolamine (MEA) and later recovered in a separate stripper column for use as an ingredient in urea production.

Now essentially hydrogen, the synthesis gas stream is further purified by scrubbing with caustic, drying, and finally by washing with liquid nitrogen. Some nitrogen remains after the wash but not enough to produce the ratio for ammonia production.

Nitrogen from the air plant is added to achieve a hydrogen-nitrogen ratio of 3 to 1 and the resultant synthesis gas is compressed to 8,000-12,000 psi. At this pressure they are reacted over a catalyst in the Casale to form ammonia.

The Casale System

The Casale ammonia system is unique in that unreacted gases are recirculated by an ejector rather than by compressor. In addition, the high pressure employed permits condensation of just-synthesized anhydrous ammonia at normal cooling water temperatures rather than requiring refrigeration.

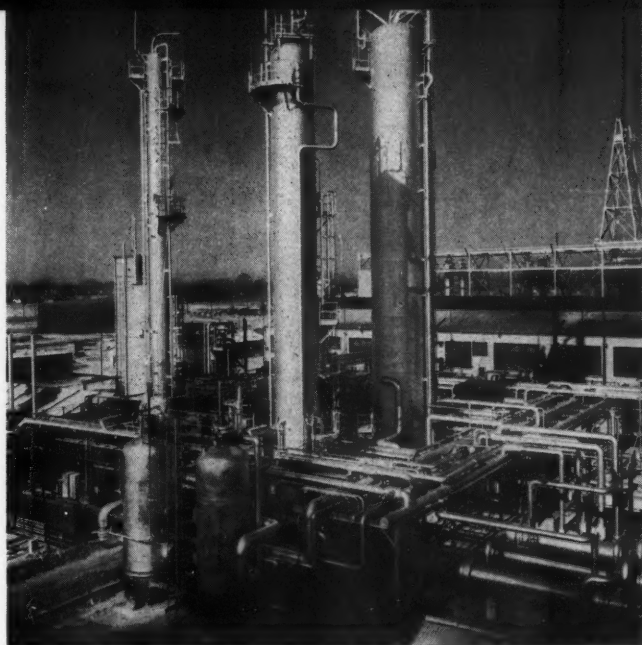
After condensation, ammonia is stored directly or as aqueous solution, absorbed in water.

Carbon dioxide and ammonia are the raw materials for the urea plant. CO_2 from the MEA stripper is compressed, preheated and purified, and the two ingredients are sent to the urea autoclave where, in an oil medium and, under about 300 psi, they are reacted to form urea and water.

Techiney Process

Oil in the autoclave forms the basis of the Techiney urea process and has three advantages: it coats walls of the autoclave, reducing corrosion; provides a means for controlling reaction temperature and provides a means

or recycling any unreacted materials. Material from the autoclave is sent to a stripper tower where unreacted ingredients are removed, recombined in an oil slurry and recycled to the autoclave. The bottoms from the stripper are separated into two layers in the decanter, one of urea is dissolved



Grace's new nitrogen plant for production of ammonia and urea was formally dedicated on Jan. 6. Towers in the foreground from left to right, are the synthesis gas caustic scrubber, and CO_2 absorber, and MEA reactivators.

in water and the other, in oil.

Solid urea is recovered by one of two paths, one producing a prilled grade for fertilizer or cattle feed supplement use and the other resulting in crystalline urea.

For fertilizer grade, solution from the decanter is vacuum-evaporated to a concentrated state and sprayed into the air at the top of a prilling tower where it is cooled and solidified as it falls to the bottom, into small pellets. These prills are further cooled, dusted with clay and conveyed to bagging and storage.

The crystalline form is produced by purifying the solution, removing the last traces of unreacted ingredients, filtering and crystallizing in a large vacuum crystallizer. Crystals are recovered by a centrifuge, dried in a rotary kiln and conveyed to bagging and storage.

Most of the Grace ammonia is being marketed in the Mid-south region and the lower corn belt area. The urea is to be sold nationwide and will be exported.

Located on Old Millington road in Woodstock, about six miles north of Memphis, the plant occupies a 277 acre site.

Service buildings were constructed by the Memphis firm of Dougherty-Liddell Construction co. and were designed by W. C. Jones, Jr., Memphis architect. ♦

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Note how the Auto-Scoop crowds into pile at ground level and can tilt bucket back before hoisting. Fast retracting action can actually flip load into bucket, enables operator to obtain full bucket even from small stockpiles.



Lower bucket tilt-back, lower carry bring you **higher** daily production

Insure full bucket without traction crowding, improve stability, speed travel.

Every feature of the Jaeger 12 cu. ft. Auto-Scoop is specially engineered to cut your cost of bulk handling. A unique advantage is ability to move into material and then retract the bucket independently of hoisting, repeatedly if necessary, at ground level.

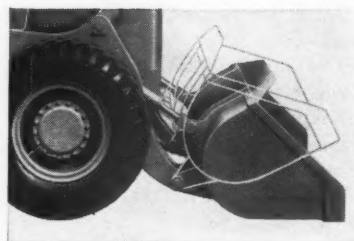
Thus, the operator can load stubborn materials *without the traction crowding that causes excessive clutch slippage or tire wear*. He simply works material into the bucket with the tilt-back action as he moves forward. As the bucket fills, traction is increased by the downward thrust on the front driving wheels, right from the start.

In addition, low-level tilt-back enables the operator to load from small stockpiles or

windrows where materials tend to move away—to actually flip the load into the bucket. It also permits carrying full bucket as low as 4½" above the ground, provides lower center of gravity which improves stability in travel, results in faster operation. And in such applications as carrying from stockpile to mill, it avoids the need for repeated hoisting and lowering.

Other features that help you cut handling costs include greater lifting capacity (1200 lbs.), more power (33 hp @ 1800 rpm), faster speeds (to 13.88 mph in reverse, 7.66 forward), shorter turning radius (6'6"), higher clearance (4'6" under lip, 6'8" under hinge) and longer reach (2'7"). Write for Catalog L12-4 and name of the nearest Jaeger Auto-Scoop distributor.

(*Comparisons based on other well-known scoop loaders now in the field.)



How hydraulic pistons retract the bucket independently of hoisting action. By combining tilt-back and hoisting, the most stubborn materials are readily loaded, does away with traction crowding that causes slippage.

For bigger work, Jaeger offers the 1 cu. yd. Load-Plus, with torque converter, power steering and either front-wheel or 4-wheel drive.

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FARM CHEMICALS

A Review of Insecticide-Fertilizer Mixtures

By Walter M. Kulash

North Carolina Agricultural Experiment Station, Raleigh

Part I. HISTORICAL

THE idea of mixing an insecticide with a fertilizer for the purpose of doing two jobs at one time is not new. It is difficult to say just when such mixtures were first used. However, as early as 1902, an intrepid entrepreneur was trying to market profitably an in-

secticide-fertilizer mixture under the encouraging brand name of "Nature's Wonder." This mixture was not held in great esteem by California authorities (Colby 1902-3) who, upon testing it, found its insecticidal value as nil, exactly equal to its fertilizer value.

Effect of Fertilizer on Insect Control

About 1890, there was considerable interest in the use of fertilizers alone for subterranean insect control. Kainite, a mixture of potassium chloride and magnesium sulfate used as a fertilizer, had been considered for wireworm control (Comstock and Slingerland 1891, Langenbuch 1933, Neuwirth 1932, Smith 1891, 1893a). The effect of kainite on *Melolontha vulgaris* is reported by Blattny (1936) who found 50 per cent of the larvae in soil killed by applications of 540 pounds per acre. Other compounds mentioned for wireworm control by Comstock and Slingerland (1891) included salt, muriate of potash and lime. The beneficial effects of nitrate of soda for soil insect control were noted by Smith (1893b) who prophesied that intelligent farm practice and proper use of chemical fertilizer would be the main reliance of the farmer in his warfare against insects. Another reference to nitrate of soda is that of Neale (1891), in Delaware, who believed it was helpful to corn in resisting damage by *Crambus caliginosellus* Clem.

The effect of boron on agricultural pests has been frequently noted. Poos (1942) concluded that boron produced no significant differences in leafhopper populations on alfalfa. Medler and Albert (1953) report about the same thing not only for the potato leafhopper but also for other alfalfa pests. The beneficial effects of fertilizer coupled with a boll weevil dusting program in cotton production were demonstrated by Robinson (1942), Robinson and Arant (1932), and Robinson and Mayton (1941). McGarr (1943) showed that increase in nitrogen increased aphid populations on cotton when calcium arsenate was used for boll weevil control. Eden (1953) found no effects

Presented at the 28th annual meeting, Cotton States Branch, Entomological Society of America, with the title "Insecticide Mixtures—Pros and Cons" as part of a symposium on "The Use of Insecticides for the Control of Subterranean Pests." Published with the approval of the director of research, as paper no. 566 of the Journal Series.

on rice weevil damage to corn from varying rates of phosphatic or potassium fertilizers. In one of four tests with nitrogen, he found a statistically significant increase in rice weevil damage as rate of nitrogen was increased.

Other References

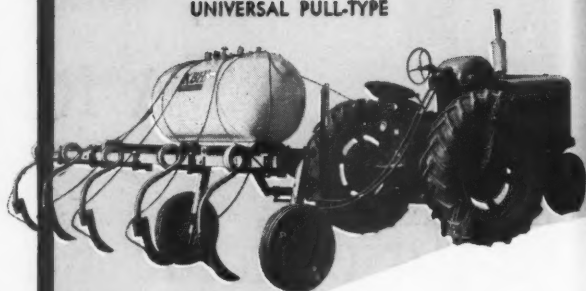
There are many other references to the effects of fertilizers in protecting plants from soil insect damage or in helping the plants to outgrow such damage. Liberal amounts of stable manure and commercial fertilizers were reported by Thomas (1911) as affecting corn favorably in respect to damage by corn and cotton wireworms. The advantages of proper fertilization in retarding insect infestation are discussed by Harlan (1946). The value of fertilizer in increasing plant vigor is noted by Hawkins (1928) but he states that in Maine fertilizers have no value as a repellent or as an insecticide, and they will not reduce the number of wireworms in a field. About the same opinion is expressed by McDougall (1934) in regard to wireworms in central Queensland sugar fields.

Not All Beneficial

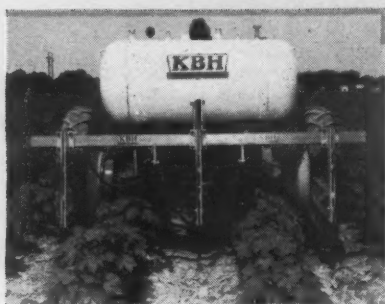
Not all fertilizers have a beneficial effect in controlling or suppressing insect pests of plants. Some fertilizers seem to encourage the development of insects. Reid (1936) has noted that the seed corn maggot (*Hylemya cilicrura* (Rond.)), attacking spinach in South Carolina is attracted to fertilizers containing certain organic materials. The adult flies are attracted to such materials and are stimulated to oviposit. Furthermore, the young maggots develop on the food they

KBH

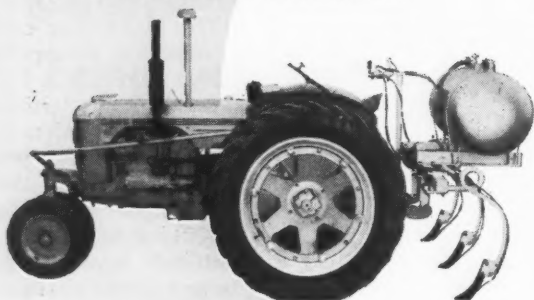
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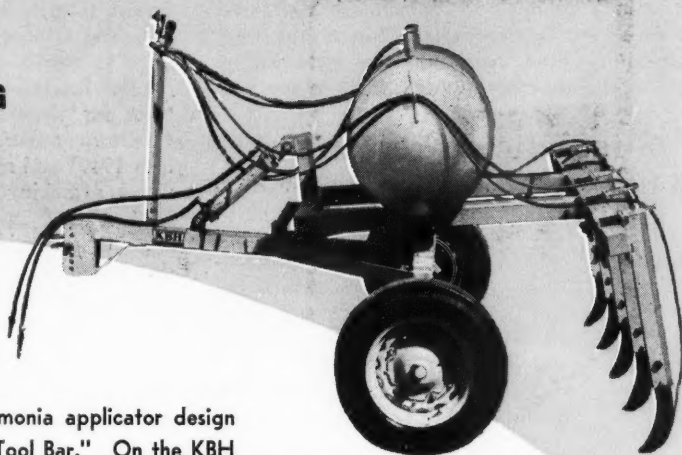


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THE KBH CORPORATION OF CLARKSDALE, MISSISSIPPI

FARM CHEMICALS

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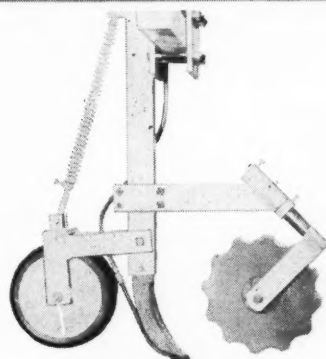
This new idea in ammonia applicator design features a "Rocking Tool Bar." On the KBH Deepseal the wheels of the applicator never leave the ground. Proper depth is obtained by rocking the entire weight of the ammonia tank and tool bar onto the applicator shanks and knives by means of the hydraulic cylinder. The rugged, heavy-duty tool bar on the Deepseal is made of 4" x 3" x 3/8" angle assuring long life construction and maximum applying depths.

CONVERTIBLE FEATURES ADD EXTRA VALUE TO EVERY KBH APPLICATOR

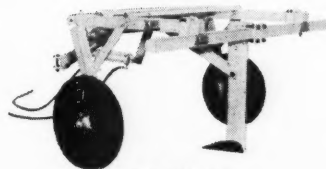
KBH COULTER AND PRESS WHEEL ASSEMBLIES quickly convert any model to broadcast work. Scalloped, swivel coulters slashes turf, stalks and stubble ahead of foot. Semi-pneumatic press wheel gives positive seal under any soil conditions.

THE KBH SUB-SOILER attached to the chassis of the Universal Pull-Type gives you one of the most effective sub-soiling tools available. It will penetrate to a depth of 20 inches when pulled by a 50 HP tractor, and stand up under steady work in toughest soils.

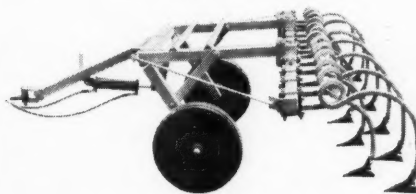
THE KBH FIELD CULTIVATOR is made by adding our special heavy-duty coil cultivator tines to the tool bar of any KBH pull-type or rear-mounted model. Staggering the long and short tines prevents trash clogging. You can cultivate to a depth of 15 inches. The number of tines depends on the size sweeps you use.



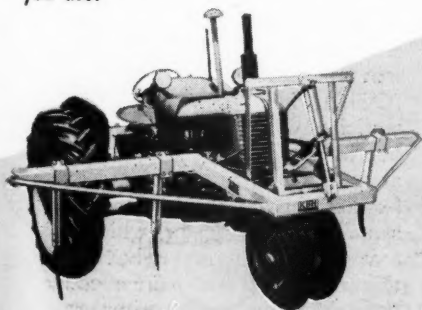
COULTER AND PRESS WHEEL



SUB-SOILER



FIELD CULTIVATOR



FRONT-MOUNTED DEEPSEAL

THE KBH CORPORATION OF CLARKSDALE, MISSISSIPPI

derive from the organic matter in these fertilizers. Dahms and Fenton (1940) report that resistance to chinch bug attack in certain sor-

ghums was continuously decreased by sodium nitrate but, on the other hand, resistance was increased by superphosphate added to the soil.

Development of Insecticide-Fertilizer Mixtures for Insect Control

Emphasis on the beneficial effects of fertilizers alone in controlling or lessening subterranean insect damage may have delayed interest in the development of mixtures of insecticides and fertilizers. Patents of such mixtures, however, began to appear early in the century. In 1904, an abstract in CHEMICAL ABSTRACTS describes a patent issued on Sept. 3, 1904 in France to Jenkner and Pleyl for a mixture designed for killing the "vine" insect. This mixture was reported to have contained calcium hydroxide, potassium cyanide and ammonia.

Related Patents

In a cursory examination of all the issues of the American and British Chemical Abstracts a total of 31 patents relating to mixtures of insecticides and fertilizers were found. Twelve of these patents were issued in the United States, 10 in Great Britain, 5 in France, 2 in Germany and 2 in Canada. Over 60 chemical compounds are included in these mixtures—some contain plant nutrients and some are insecticidal. A listing of these patents is given in table 2. (Ed. Note: to appear next month.)

No doubt the unrecorded use of insecticide-fertilizer mixtures has been just as frequent as the uses reported in the literature. One of the earlier recommendations in this regard is that of Theobald (1927) who suggested drilling in an artificial manure and naphthalene or other insecticide with the seed for the control of wireworms. The patented mixtures were special use formulas and had no obvious advantages as soil insecticides. However, the possibility of more satisfactory control with the new organic insecticides has heightened the interest in insecticide-fertilizer mixtures.

Prior to the widespread use of the new organic insecticides, there were only a limited number of compounds suitable for use as soil in-

secticides. Probably the best known example among the inorganic materials is lead arsenate, which has had extensive use as a soil treatment for Japanese beetle grub control (Fleming 1942). Several tons of lead arsenate mixed with fertilizer were formulated in the Middle Atlantic states for a number of years prior to World War II (Mehring 1953). Calcium arsenate, though not used principally as a soil insecticide, caused some concern because of the danger of accumulating toxicity effects in the soil when used in foliar applications as a dust to control the cotton boll weevil (Cooper *et al* 1931, Dorman and Coleman 1939). None of the earlier-used inorganic materials were spectacular in their effects on soil insects. An extensive review of some of these materials is presented by Gough (1945).

Early N. C. Work

Some of the early control work on southern corn rootworm (*Diabrotica undecimpunctata howardi* Barber) was the forerunner of insecticide-fertilizer tests in North Carolina. Fulton (1946) demonstrated good control of rootworms by adding DDT or BHC to hills already containing fertilizer and then mixing the insecticide in the corn hill with the fertilizer and soil. Subsequent field trials for the control of wireworms (*Conoderus* spp.) by the author (Kulash 1947) utilized factory mixed formulations of DDT and BHC. As far as is known, this was the first instance of actual factory mixing of insecticides with fertilizer in North Carolina.

Wireworm Control

Wireworm control tests have occupied much of the writer's research time for the past several years. Since 1950, extensive field tests with insecticide-fertilizer mixtures have been conducted in peat muck soil of eastern North Carolina for the control of *Melanotus communis* (Gyll.) and *Conoderus*

lividus (Deg.) (Kulash 1954, Kulash and Monroe 1954b). Other tests in North Carolina have included insecticide-fertilizer mixtures for the control of billbugs (*Calendra maidis* (Chitt.)), (Kulash 1949) and southern corn rootworm attacking peanuts (Ritcher *et al.* 1952).

A general review of the literature on insecticide-fertilizer mixtures shows that such mixtures have been used chiefly for the control of wireworms, rootworms, mole crickets, seed corn maggots and green June beetle larvae. A listing of some of the insects against which mixtures of insecticide and fertilizer have been tried and the insecticides used is given in table 1. These mixtures have been used principally in the Southern states, although recently extensive use of insecticide-fertilizer mixtures has been reported in Iowa for the control of the corn rootworm (*Diabrotica longicornis* (Say)), (Lilly 1954).

New Organics

Most, if not all, of the new organic insecticides have been used in mixtures with fertilizers. BHC has attracted a good deal of interest and notoriety because of the off-flavor it has imparted to root crops. Lindane, though not as objectionable as BHC in this regard, is nevertheless not recommended in North Carolina for use on peanuts in mixture with fertilizer or as a soil treatment (Ritcher *et al.* 1953). DDT has been used for a number of soil inhabiting species with varying amounts of success. Fleming (1950) found DDT killing Japanese beetle grubs five years after being added to the soil. Chlordane has been used at 1 to 10 pounds per acre (Compton 1949). Kulash and Monroe (1954b) found it relatively effective against wireworms (*Melanotus communis* (Gyll.)) when applied as a soil insecticide well ahead of planting, but not so effective when applied at the time of planting mixed with fertilizer in the drill row. In the same tests, heptachlor, which has a vapor pressure somewhat lower than chlordane, was more effective than chlordane against wireworms. Toxaphene has also been used in mixture with fertilizer. Its rapid breakdown in the soil (Mehring 1953) is considered an advantage



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Table 1. List of Fertilizer-Insecticide Mixtures Used for Insect Control

Insect	Material	Pounds ¹ of Active Ingredient per Acre	Crop	Reported by
Sand wireworm	Benzene hexachloride	0.125-1 ²	Corn	Floyd 1949, Woodle & Nettles 1950
(<i>Horistonotus uhleri</i> Horn)	Chlordane	0.5-2		Watts & Nettles 1951
	DDT	0.5-4		
	Toxaphene	0.5-4		
Melanotus communis (Gyll.)	Benzene hexachloride	0.2-0.4		Kulash 1947
Conoderus lividus Deg.	BHC and DDT	0.2 BHC and 5.0 DDT		
Glyphonyx bimarginatus Schfr.	DDT	2.5, 25		Ibid, Kulash & Monroe 1954a, 1954b
Conoderus bellus (Say)				Ibid 1954a, 1954b
	Aldrin	1, 2, 4		
	Chlordane	5, 10		
	Dieldrin	1, 2, 4		
	Heptachlor	1, 2, 5		
	Lindane	2, 4		
	Potassium ethyl xanthate	500		Kulash & Monroe 1954a
	Demeton	4		Ibid 1954b
	Parathion	5, 10, 20		Ibid 1954a, 1954b
	EPN ¹	4 lbs.		Ibid 1954b
Conoderus vespertinus (Fab.)	Chlordane	Light-heavy	Tobacco	Allen 1950
Limoniectypus (Say)	Benzene hexachloride	4 oz.	Potatoes	Armand 1948
	Chlordane	4 oz.		
Agiotes mancus (Say)	Chlordane	5		
Melanotus spp.	Chlordane	5		Merrill 1952
Various wireworms spp.	Chlordane	4.3	Vegetable crops	Wolfenbarger & Kelsheimer 1950
		5		
		5	Sweet corn	Thames 1951
		4	Sugar cane	Ibid 1954
	Aldrin	3		
	Benzene hexachloride	3		
	Heptachlor	3		
	Lindane	3		
	Parathion	3		
	Toxaphene	6		
Southern corn rootworm (<i>Diabrotica undecimpunctata howardi</i> Barber)	Benzene hexachloride	0.8-1.25	Corn	Floyd & Smith 1949
	Chlordane	1.5		Ibid, Woodle & Nettles 1950
		0.5, 2	Peanuts	Ritcher et al. 1952, Poos et al. 1951
	DDT	25	Corn	Floyd & Smith 1949
	Dieldrin	0.5, 1	Peanuts	Ritcher et al. 1952
	Heptachlor	1, 2		
	Lindane	0.25, 1.25		Ibid, Poos et al. 1951
Corn rootworm (<i>Diabrotica longicornis</i> (Say))	Aldrin	1	Corn	Cox & Lilly 1953, Wolf 1952
	Chlordane	1		
	Dieldrin	1		
Seed-corn maggot (<i>Hylemya cilicrura</i> (Rond.))	Benzene hexachloride	1		Floyd & Smith 1949
	Chlordane	1.5		Ibid, Woodle & Nettles 1950
	DDT	25		Floyd & Smith 1949
Green June beetle larvae (<i>Cotinis nitida</i> (L.))	Aldrin 1% dust	4/100 sq. yds.	Tobacco	Dominick 1950
	Dieldrin 1% dust	4/100 sq. yds.	Seed beds	
	Parathion 1% dust	4/100 sq. yds.		
	Aldrin	2	Ladino clover	Howe & Campbell 1953
	Benzene hexachloride	0.5-1.5	Pasture	Marcovitch & Stanley 1950
	Chlordane	5, 10		
	Dieldrin	2	Ladino clover	Howe & Campbell 1953
	Heptachlor	2		
	Parathion	2	Pasture (Alfalfa & Oats)	Marcovitch & Stanley 1950
	Toxaphene	20	Ladino clover	Howe & Campbell 1950
Japanese beetle larvae (<i>Popillia japonica</i> Newm.)	Aldrin 2.5% dust	1-6	Turf	Schread 1949
	Chlordane 10% dust	8-24		
		9.6		Polivka 1950a
	DDT	25		Schread 1953
	Endrin	0.5, 1, 2		
	Heptachlor	1.5, 10, 20		Polivka 1950b
	Isodrin	0.5, 1, 2		Schread 1953
	Lead arsenate	500		Polivka 1950a

Insect	Material	Pounds ¹ of Active Ingredient per Acre	Crop	Reported by
	Toxaphene 10% dust	20 8-24		Schread 1950 Schread 1948
White-fringed beetle larvae (<i>Pantonomorus leucoloma</i> (Boh.))	DDT DDT Chlordane Aldrin Heptachlor Dieldrin	1.5, 3 10 5 4 4 1.5	Row crops	Young & Gill 1948 Anon. 1954
Annual white grub (<i>Cyclocephala borealis</i> Arrow)	Heptachlor	1, 5, 10, 20		Polivka 1950b
White grubs (<i>Phyllophaga</i> spp.)	Heptachlor	1, 5, 10, 20		
Oriental beetle (<i>Anomala orientalis</i> Waterh.)	Endrin Isodrin	0.5, 1, 2 0.5, 1, 2	Turf	Schread 1953
Maize billbug (<i>Calendra maidis</i> (Chitt.))	Chlordane DDT Lindane Parathion	2.0 5.0 0.2 0.5	Corn	Kulash 1949
Cane grubs	Benzene hexachloride		Sugar cane	Wilson, G. 1951
Sweetclover weevil (<i>Sitona cylindricollis</i> Fahr.)	DDT	1.5	Clover	Wilson, M. C. 1951
Elongate flea beetle larva (<i>Systena elongata</i> (F.))	Benzene hexachloride	1.5	Potatoes	Marcovitch & Stanley 1950
Grape colaspis (<i>Colaspis flavida</i> (Say))	Aldrin Chlordane Dieldrin Heptachlor Lindane	1 1 1 1 1	Corn	Stone & Smith 1951
Squash vine borer (<i>Melittia cucurbitae</i> (Harris))	Chlordane Dieldrin Lindane Parathion	0.25, 0.5 ² 0.25, 0.5 0.25, 0.5 0.25, 0.5	Squash	Howe 1950
Southern mole cricket (<i>Scapteriscus acletus</i> R. + H.)	DDT 2%	150 ³	Vegetable Seed beds	Kelsheimer 1947
Puerto Rican mole cricket (<i>Changa</i>) (<i>S. vicinus</i> Scudd.)	Chlordane	1		Kelsheimer 1948, 1950
Short-winged mole cricket (<i>S. abbreviatus</i> Scudd.)				
Northern mole cricket (<i>Gryllotalpa hexadactyla</i> Perty)				
Cutworms Earwigs Ants & certain other soil inhabiting sp.	Chlordane	1		Kelsheimer 1950
Chinch bugs Fall armyworms Ants	Chlordane 5% dust	10/1000 sq. ft.	Lawns	Kelsheimer 1948

¹Except as noted.

²Grams per hill.

³All dosages for benzene hexachloride based on gamma isomer content.

⁴Ethyl p-nitrophenyl thionobenzene phosphonate.

in that there is little danger from residual effects. Generally speaking, though, on a pound to pound basis, toxaphene is not considered as effective against soil pests as are some of the other new hydrocarbon compounds, such as aldrin and heptachlor. There does not seem to be much enthusiasm or demand for mixtures of fertilizer and phosphate insecticides although they

have been used for some soil pests (table 1.)

Insecticide-fertilizer mixtures kill chiefly by the contact action of the insecticidal constituent of such mixtures. In some instances, a fumi-

¹ Suggested in a letter to the author from W. Peter Host of Mathieson Chemical corp., Research Laboratory, Niagara Falls, N. Y., dated June 1, 1950.

gating action has been regarded as responsible for the killing. In the case of mixtures of potassium ethyl xanthate and superphosphate, a quantity of carbon disulfide is evolved¹ when the mixture is placed in the soil. The carbon disulfide is supposed to kill the soil pests or repel them (Kulash and Monroe 1954a).

End of Part I



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- onion and cabbage maggots

**aldrin controls
these pests above the ground:**

- boll weevils
- fleahoppers
- rapid and tarnished plant bugs
- thrips • cutworms
- grasshoppers
- stink bugs
- alfalfa weevil larvae
- fall armyworms... and others

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- seed corn maggots • wireworms • sugar beet maggots

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- Japanese beetle grubs
- ants • white grubs
- lawn chinch bugs
- sow bugs and others

Public Health pests

- houseflies
- mosquitoes
- fleas
- ticks
- cockroaches
- and others

Vegetable pests

- tuber flea beetles
- leaf miners
- onion thrips
- root maggots
- sweet potato weevils
- and others

Fruit pests

- plum curculio
- lygus bugs
- stink bugs
- and others

**Cereal and
forage crop pests**

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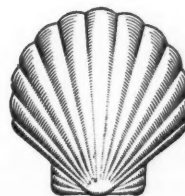
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A Preliminary Report

1953-54 Fertilizer Consumption

By Walter Scholl, Hilda M. Wallace and Esther I. Fox

Fertilizer and Agricultural Lime Section

Soil and Water Conservation Research Branch

*Agricultural Research Service
USDA, Beltsville, Md.*

FOR the year ended June 30, 1954, a preliminary estimate indicates that use of chemical fertilizer in the United States and Territories (Hawaii, Puerto Rico, and Alaska) amounted to 22,875,000 short tons, a decrease of 538,000 tons or 2.3 per cent from the quantity used in 1952-53.

Consumption of commercial mixtures amounted to 15,675,000 tons, materials containing primary plant nutrients (N, P_2O_5 , K_2O) for direct use to 6,620,000 tons and secondary and trace element materials to 580,000 tons. These quantities were, respectively, 0.3, 2.8 and 33.9 per cent below the consumption in 1952-53.

The total tonnage of fertilizer used in July-December 1953 was approximately 18 per cent less than in the corresponding period of 1952, while the tonnage used in January-June 1954 was 4 per cent more than in the corresponding period of 1953.

Regionally, the total consumption of fertilizer east of the Mississippi River was 2 to 7 per cent less than in 1952-53 (table 1), whereas it was up to 7 per cent more in the areas west of the Mississippi. Consumption in the territories was 7 per cent more than in 1952-53. Increases in the consumption of mixed fertilizers (2 to 18 per cent) occurred only in the Middle Atlantic, West North Central and Pacific regions and the territories. The tonnage of materials for direct use was higher (2 to 10 per cent) only in the West North Central and Mountain regions and the territories.

Table 1. Preliminary estimate of fertilizer consumption, year ended June 30, 1954¹

Region	All fertilizers ²		
	Mixtures 1,000 tons	Quantity 1,000 tons	Relative consumption 1952-53 = 100 Per cent
New England ³	365	435	93
Middle Atlantic ⁴	1,850	2,080	98
South Atlantic ⁵	4,990	6,095	97
East North Central ⁶	3,685	4,870	95
West North Central ⁷	1,350	2,235	107
East South Central ⁸	2,025	3,080	97
West South Central ⁹	715	1,395	99
Mountain ¹⁰	65	385	106
Pacific ¹¹	350	1,900	94
Continental U. S.	15,395	22,475	98
Territorial ¹²	280	400	107
Total: 1953-54.....	15,675	¹² 22,875	98
1952-53.....	15,722	¹³ 23,413	100
1951-52.....	15,086	¹³ 22,432	96

¹ Includes fertilizers distributed by government agencies.

² Includes mixed fertilizers, primary nutrient materials used directly, colloidal phosphate and phosphate rock, basic slag, processed manures, sewage sludge, secondary and trace element materials. Does not include liming materials, but includes gypsum.

³ Maine, N. H., Vt., Mass., R. I., Conn. ⁴ N. Y., N. J., Pa., Del., D. C., Md., W. Va.

⁵ Va., N. C., S. C., Ga., Fla. ⁶ Ohio, Ind., Ill., Mich., Wis. ⁷ Minn., Iowa, Mo., N. D., S. D., Neb. Kan.

⁸ Ky., Tenn., Ala., Miss. ⁹ Ark., La., Okla., Tex.

¹⁰ Mont., Idaho, Wyo., Colo., N. Mex., Ariz., Utah, Nev.

¹¹ Wash. Oregon, Calif. ¹² Hawaii, P. R. Alaska.

¹³ Materials not guaranteed to contain N, P_2O_5 , or K_2O included in 1953-54 totals, 580,000 tons; in 1952-53, 877,487 tons and in 1951-52, 785,050 tons.

Primary Nutrients

Consumption of primary plant nutrients amounted to 5,851,000 short tons (table 2). This was an increase of 203,000 tons, or 3.6 per cent over the quantity in 1952-53. The increase in nitrogen was 173,000 tons (10.6 per cent) and in K_2O 74,000 tons (4.3 per cent), but the consumption of P_2O_5 decreased 44,000 tons (2 per cent).

The amounts and proportions of the nutrients consumed in mixed fertilizers were 798,000 tons (44 per cent) for nitrogen, 1,789,000 tons (80 per cent) for P_2O_5 and 1,609,000 tons (89 per cent) for K_2O . Materials for direct use accounted for 103,000 tons of the increase in nitrogen.

Although mixtures supplied 7,000 tons more P_2O_5 than in 1952-53 the use of this nutrient in direct-application materials decreased 51,000 tons. The use of K_2O increased 55,000 tons in mixtures and 19,000 tons in materials for direct application. In most regions east of the Mississippi, there was a decrease in the use of P_2O_5 both in mixtures

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and as material for direct application.

Weighted Averages

The weighted average plant nu-

trient content of mixtures is shown in table 2. The national average increased from 25.85 per cent in 1952-53 to 26.8 per cent in 1953-54. This average, in 1953-54, com-

prised nitrogen 5.1, P_2O_5 11.4 and K_2O 10.3 per cent. The values for these nutrients in 1952-53 were 4.63, 11.34 and 9.88 per cent, respectively. ♦

Table 2. Preliminary estimate of primary plant nutrients contained in all fertilizers and average nutrient content of mixtures, year ended June 30, 1954

Region	Total Nutrients					
	N	Available $P_2O_5^1$	K_2O	Quantity	Relative consumption 1952-53 = 100	Weighted per cent in mixtures
	1,000 tons	1,000 tons	1,000 tons	1,000 tons	Per cent	Per cent
New England.....	26	44	47	117	93	28.4
Middle Atlantic.....	110	238	186	534	101	26.4
South Atlantic.....	378	473	468	1,319	99	22.0
East North Central.....	266	534	584	1,384	103	31.7
West North Central.....	234	331	155	720	116	35.4
East South Central.....	267	284	210	761	101	23.6
West South Central.....	164	151	92	407	105	26.3
Mountain.....	69	58	3	130	115	29.9
Pacific.....	240	94	31	365	110	27.2
Continental U. S.....	1,754	2,207	1,776	5,737	104	26.7
Territorial.....	56	20	38	114	104	28.9
Total: 1953-54.....	1,810	2,227	1,814	5,851	104	26.8
1952-53.....	1,637	2,271	1,740	5,648	100	25.9
1951-52.....	1,422	2,199	1,582	5,203	92	24.9

¹ Includes 2 per cent of the colloidal phosphate and 3 per cent of the phosphate rock marketed for direct application, as available P_2O_5 .

Aylward's Sullivan Plant

I NSTALLATION of a stainless steel pipe and tube system at the Sullivan, Ill., liquid fertilizer plant of Aylward Fertilizer co. has resulted in a savings of some 300 per cent in material costs alone after eight months of operation over the former network of plastic tubing.

Plant Food Ingredients

Phosphoric acid, potash, aqua ammonia and urea are the basic ingredients of the concentrated liquid plant food turned out by Aylward. The phosphoric acid, water and aqua ammonia are first placed in a stainless steel vat and mixed, with the dry potash and urea added to produce the final blend.

Tank trucks hold 1,000 gallons of solution, and are filled in about 30 minutes through a $\frac{3}{4}$ inch heavy duty rubber hose. These units are equipped with 33 to 40 foot stainless steel spray booms operated under a maximum pressure of 40 psi.

Plastic tubing was originally used in the installation, but broke down under the heat and corrosive attack of the ingredients in about two weeks.

Three Types of Stainless Used

Aylward uses three sizes of type 403 stainless steel

from the Alloy Tube div. of Carpenter Steel co. in the installation: $1\frac{1}{2}$ inch schedule 5 pipe, $1\frac{1}{2}$ inch schedule 40 pipe and 1 inch tubing. Straight carbon steel was not tried because of the danger of particles chipping off into the solution. Expected life of the system is set at 10 years.

The firm, with offices at El Paso, Ill., is headed by Edward Aylward and the Sullivan operation is managed by Arthur Aylward. ♦

This spray boom or spray bar can spray a strip 33 feet wide at a time, and approximately 40 acres in an hour. Nozzles in bar have adjustable tips to regulate spray.



INFORMATION on several papers delivered by USDA and experiment station researchers at the Dec. 6-8 Houston, Tex., meetings of the Entomological Society of America has now been released.

Here's a brief report on aspects of the talks that will be of special interest to the industry.

Cotton Pests Chemicals

Two promising organic phosphates for control of cotton pests were announced by USDA's E. E. Ivy and A. L. Scales and J. R. Brazzel and D. F. Martin of the Texas AES. The two chemicals, both benzeol triazine derivatives one of a dithiophosphoric acid ethyl ester and the second of a dithiophosphoric acid methyl ester were said to be "very promising" although not yet ready for the grower.

Extensive field testing is slated for the two materials which have been designated 16259 and 17147 respectively.

In Texas lab tests, compound 17147 provided 100 per cent kills off boll weevil at spray rates as low as $\frac{1}{4}$ pound per acre and 16259 was as effective at $\frac{1}{2}$ pound. Both materials were highly effective against the cotton aphid, spider mites and the cotton leafworm, and compound 17147 was equally lethal to the brown cotton leafworm, flower thrips and cotton leafhopper.

The latter material was so effective against pink bollworm larvae (4 times as effective as DDT) that it was field tested in south-central Texas last fall with very encouraging results.

Dust for Rose Pests

Another paper, presented by Floyd F. Smith, Edgar A. Taylor and W. D. McClellan, all of USDA, noted progress made toward a combination dust, for control of rose pests.

The best fungicide-miticide combination included 3.4 per cent copper oxy-sulfate, 25 per cent sulfur and Aramite. This was effective against black spot and mildew and helped hold down the spider-mite. Aramite proved equal or superior to other miticides that were tested.

The best rose dust tested con-

taining the fungicide-miticide mixture plus two insecticides controlled effectively aphids, potato leafhopper and spider mites but did not halt adult Japanese beetles or flower thrips.

Another new phosphate insecticide, one tested for control of cattle grubs, was the subject of a paper by A. R. Roth and Gaines W. Eddy of USDA's Corvallis, Ore., laboratory. This material, designated as 21/199 and chemically 3-chloro 4-methylumbelliferone 0,0-diethylthiophosphate, is the first new spray to prove as effective as the standard rotenone.

Tests carried out by Roth and Eddy were preliminary in nature, and extensive work is required on investigation of toxic effects of cattle. An 0.5 per cent spray of 21/100 killed all grubs on nine cattle within a week in recent tests, and this material and two other experimental compounds were completely effective when applied as washes to the backs of infested cattle.

Baits for Flies

J. C. Keller reported on work carried out in conjunction with H. G. Wilson and Carroll N. Smith, all USDA entomologists, on development of insecticidal baits against flies. He stated that several chemicals have provided nearly perfect control.

Insecticides were all organic phosphates and included malathion and L 13/59 and two promising newcomers, chlorothion and OS-2046. All were diluted in mixtures of molasses, malt or sugar and water.

USDA Workers Speak At Houston ESA Meet

At a rendering plant one material reduced the fly population 99 per cent within four hours, and at a city dump, control of houseflies and blowflies ranged between 97 and 99 per cent 24 hours after treatment.

On garbage and trash piles in an urban slum area, daily treatment provided progressively better control until, at the end of five days, it was 90 per cent or better.

On garbage and trash piles a 1 per cent chlorothion in malt bait was the most effective control for blowflies; at the rendering plant, daily application of 1 per cent OS-2046 in malt was best for a predominant blowfly population; on city garbage dumps, both houseflies and blowflies were controlled with malt and 1 per cent OS-2046 or 2 per cent malathion. Nearly as effective were 0.2 per cent L 15/39 in a sugar-water solution and 2 per cent malathion in blackstrap molasses.

Dr. Carroll N. Smith of USDA read a paper which reviewed work conducted on development of new mosquito repellents. He reported discovery of 11 new compounds, all superior to present repellents. Further testing is necessary before any will be released for use.

One material, designated 20218, was found remarkably repellent to the malaria, the yellow-fever, two species of salt-marsh and the glades mosquitoes. Chemically it is N,N-diethyl-m-Toluamide. Against the salt-marsh mosquitoes one other compound, the propyl ester of mandelic acid was on a par with 20218. ♦

A Review of Systemics and Meta Systox

By R. C. Scott

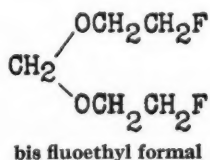
*Supervisor, Agricultural Chemicals
Research*

Pittsburgh Coke and Chemical co.

AS EARLY as 1500 the idea of control by the use of systemics was receiving some attention. There is a report from Italy that some arsenic compounds rendered plants systemic; however, this report was subsequently proved to be incorrect.

There was relatively little activity in the period between the 16th century and the 20th century. In 1936, the American investigators Hurd-Karrer and Proos determined that some selenium compounds were absorbed through the soil by wheat and that these wheat plants could not be damaged by aphids. The use of selenium compounds, however, was discouraged by the fact that high residues remained in treated crops. It must be remembered that selenium, in many instances, is more toxic than arsenic.

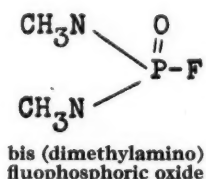
In the same year, German scientists Schrader and Kuekenenthal found that some organic materials were systemic. One of these materials, bisfluoroethyl formal, was



extensively investigated. However, these materials, too, proved to be too toxic for large scale use. That fluorinated organic materials are toxic can readily be remembered if one considers the use of

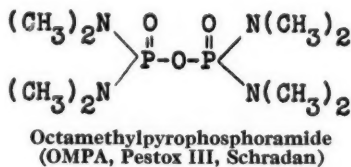
sodium fluoroacetate (1080) as a rodenticide.

Schrader continued in his search for systemic materials and subsequently was successful in developing several phosphorous compounds which were systemic. Perhaps one of the first which showed some promise was dimethylamine fluoro-phosphine oxide. While this ma-



terial has found some commercial use even though it is quite toxic, its use is limited to non-food crops.

The first phosphate chemical which has found rather widespread use as a systemic is known as octamethylpyrophosphoramide, was developed simultaneously by Ripper

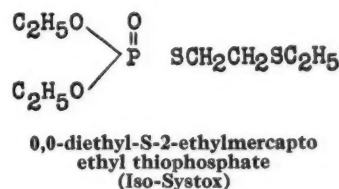
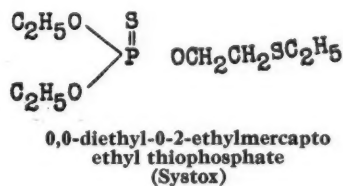


and co-workers in England and by Schrader during the years immediately following the war. Although the use of this material is limited somewhat by the complexity and toxicity of its metabolites, it is enjoying some commercial usage today.

Schrader continued his efforts to find a better systemic insecticide which would be less toxic to mammals. The result of this study was partially successful in that a prod-

uct was obtained which was more efficient insecticidally, but of the same relative order of toxicity as parathion. The chemical structure of the active ingredients of this product, originally designated as E-1059, is shown. The combination of these two active isomers is known today as demeton.

For sake of convenience, the usage of the term Systox for the isomer on the left has been developed and Iso-Systox for the



Dementon

chemical on the right. Originally, it was thought that the active ingredient of this product was Systox; however, further work indicated that such was not the case and that two materials were actually present. Today the material is produced so that it contains approximately 60 per cent Systox and 40 per cent Iso-Systox.

This systemic insecticide is being developed commercially at the present time. Partial clarification of the Systox metabolite problem and the development of an adequate residue method have resulted

TABLE 1. TOXICITY

	Oral LD ₅₀ to rats (mg/kg)	In vitro cholinesterase inhibition (In ₅₀ in Micrograms)
Meta-Systox.....	100 (approx.)	3.2
Systox.....	6-12	0.17
Parathion.....	6-15	3.2
TEPP.....	1.2- 2	0.001

TABLE 2. TOXICITY TO INSECTS

	Systox LD ₅₀	Meta Systox LD ₅₀	Ratio of Effectiveness
Wooly apple aphid.....	0.005%	0.01%	2
Apple aphid.....	0.005%	0.01%	2
Potato aphid.....	0.001%	0.001%	1
Bean aphid.....	0.0025%	0.005%	2
Chrysanthemum aphid....	0.0005%	0.00075%	1.5
Two spotted mite.....	0.001%	0.005%	5
European red mite.....	0.005%	0.01%	2
Mosquito larvae.....	0.0005%	0.005%	10
Vinegar fly.....	0.005	0.05	10

in the registration in the United States of the use of Systox on some food crops, such as apples and potatoes as well as some non-food uses, such as cotton and ornamentals.

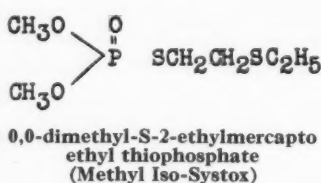
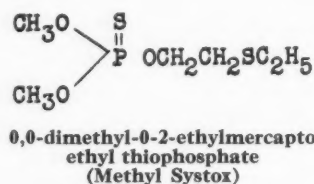
Some indication as to quantities of materials necessary for insect control might be of some interest. For example, six ounces of demeton per 100 gallons of water is the spray used for the control of red spider mite, Southern red mite and aphids on ornamentals; six ounces per acre applied two to three times during a season is sufficient to control the cotton aphid and two-spotted mite on cotton; three ounces of demeton per 100 gallons is sufficient for aphid control on potatoes and generally two to three applications per season are needed.

Methyl Systox

Methyl systox followed logically in the development of more non-toxic systemic insecticides. It can be seen that methyl systox, known commercially as Meta-Systox, is very closely related to its precursor Systox. You will note that it differs only in the replacement of methyl groups for ethyl groups. Like Systox, Meta-Systox contains two active isomers, methyl systox and methyl iso-systox. Like Systox, also, it is expected that the ratio of methyl systox to methyl iso-systox will be approximately 60:40.

Since it has been stated that the development of these insecticides has emphasized the search for more non-toxic materials, it might be of interest to examine the toxicity of

some of these phosphates. Table 5 lists some of this information. Here one notes that the oral LD₅₀ to rats (that is, the quantity necessary to kill half of a group of test rats) is approximately 100 mg/kg. The figures for Systox and parathion are given also and one can see that Meta-Systox is approximately ten times less toxic than either of these.



Meta-Systox

Further, if one considers the toxicity of tetraethylpyrophosphate (TEPP) one sees that Meta-Systox is approximately 50 times less toxic. It should be kept in mind, however, that phosphates in this order of toxicity are still considered hazardous; for example, one might compare these figures with the oral LD₅₀ of DDT, which is generally considered 250 mg/kg.

Another measure of the toxicity of these phosphates is their ability to inhibit both *in vivo* and *in vitro* the enzyme systox cholinesterase.

While the exact correlation between cholinesterase inhibition and toxicity has not been clearly elucidated, one might note from table 1. that Meta-Systox has about the same inhibitory power as parathion and is approximately 20 times less toxic than Systox.

As might be expected when a less toxic material is developed, one sacrifices, to some extent, the insecticidal efficiency of that product. Table 2. shows the toxicity of Meta-Systox compared to Systox in a series of laboratory experiments. Roughly, it can be seen from these data that Meta-Systox is approximately half as effective as Systox. It has been shown by actual field work for the past two seasons that this factor of one-half is generally true. When Meta-Systox is used at twice the rate commonly employed for Systox, one achieves equal control both in terms of initial effect and also period of control.

The problem of plant metabolism of systemic insecticides has become increasingly important over the past two or three years. A rather complete study made by several investigators has elucidated to some extent the breakdown of OMPA in plant and animal tissue. Work on Systox by Metcalf and co-workers, Tietz, Cook and others, has indicated that Systox and its isomer are converted to other compounds in the plant. The identity of these compounds has not yet been firmly established. Relatively little work has been done on the fate of Meta-Systox in plants; however, it is probable that work done on this problem with Systox will be applicable to Meta-Systox.

Detection of Residues

The detection of residues of systemic insecticides is somewhat difficult in view of the unexplained nature of the metabolite products. In the case of Systox, a method employing the inhibition of cholinesterase has proved quite satisfactory and was the method used for the collection of residue data which ultimately led to U. S. registration. Unfortunately, up to the present time, this method has not been suitable for adoption to detection of Meta-Systox residues. However, it is felt that this difficulty will be overcome in the near future.

One might logically ask that if methyl systox is generally half as effective as Systox, what is the commercial feasibility of the product. It appears at this time that commercialization of Meta-Systox will be accomplished within the next two years. It is believed that methods of production and formulation will overcome the difference in insecticidal efficiency of Systox and Meta-Systox. This, coupled

with the greater safety of use of Meta-Systox, it is believed indicates a rather bright future for this product. Obviously, a considerable amount of development work is needed before commercialization takes place. The nature of the metabolites of Meta-Systox must be ascertained. A suitable residue method must be developed which will adequately determine the residues obtained in crops. Flavor

evaluations will be made of the treated crops and, of course, additional insecticidal data will be obtained.

In many of these problems it is believed that information already obtained on Systox will make possible solution of the problem simpler. At any rate it is thought that this newest development in the systemic field will prove of considerable practical value. ♦

Pesticide Carryover Improves

AN IMPROVEMENT in the pesticide carry-over situation during 1954 was noted by USDA in a report that showed stocks of 26 major pesticide chemicals in the hands of manufacturers on Sept. 30, 1954, at a total of 134,600,000 pounds. This is a drop of about 10 per cent from the 149,500,000 pounds inventory reported on the same date a year earlier.

Last year, a total of 50,100,000 pounds, or 37 per cent of the reported stocks, was in the form of pesticide formulations, mostly ready to use. This is somewhat higher than the 47,600,000 pounds of formulations on hand in 1953, which represented 32 per cent of the Sept. 30 carry-over for that year.

Based on preliminary results of an industry survey conducted in cooperation with the National Agricultural Chemicals Association, the report is believed to represent between 90 and 95 per cent of actual inventories. A total of 141 manufacturers, including most of the major producers, provided information.

USDA officials cited 1952 as the probable high point for pesticidal carry-overs in recent years, although no comparative figures are available. They termed the drop a "healthy adjustment" from the previous surplus situation. ♦

Preliminary Results of Survey of Stocks of 26 Principal Pesticidal Chemicals Held in United States at End of Growing Season (Sept. 30)

Pesticide	Number of Reports	Total Stocks (Technical plus Mixtures), in terms of technical		Mixtures only, including Concentrates, Formulations, etc., in terms of technical	
		1953 (1,000 lb.)	1954 (1,000 lb.)	1953 (1,000 lb.)	1954 (1,000 lb.)
Aldrin (60% equivalent) . . .	55	5,082	2,590	2	2
Benzene hexachloride (gamma, except lindane)	64	5,563	6,715	1,572	2,022
Calcium arsenate . . .	39	6,381	5,255	670	770
Captan	22	1	1	1	1
Chlordane	68	1,307	1,594	586	703
Chloro-IPC	22	1,944	1,707	824	699
Copper Sulfate . . .	44	15,856	11,389	2,138	1,678
Cryolite	22	1	1	1	1
2,4-D (acid equivalent)	48	9,958	8,554	6,602	6,534
DDD (TDE)	48	3,411	2,230	1	1
DDT	90	20,497	24,933	7,950	8,718
Dieldrin	50	2,998	2,060	1	1
Dithiocarbamates . . .	43	977	1,073	550	496
Heptachlor	30	1,338	963	1	1
Lead arsenate	38	9,163	6,297	2,683	1,338
Lindane	59	712	592	118	169
Malathion	59	167	1,571	74	337
Methoxychlor	49	160	269	110	209
Organic mercurials . .	13	2	2	2	2
Parathion	60	1,468	2,095	612	759
Sodium chlorate . . .	12	2	2	2	2
Sodium TCA	33	1,216	2,207	1	1
Soil fumigants	17	2	2	2	2
Sulfur, ground	63	26,896	22,852	12,220	13,027
2,4,5-T (acid equivalent)	38	2,792	2,266	1,730	1,539
Toxaphene	65	14,858	9,360	3,467	4,033
Grand Totals		149,534	134,641	47,623	50,141

¹ Figures being maintained in confidence, but stocks reported are included in grand totals.

² Figures inadequate, but those reported are included in grand totals.



HOW TO MAKE **QUALITY** FERTILIZER

PUT SOME IN!

SMIROW, 100% natural organics, 90% water insoluble and 90% available, is a high quality source of nitrogen. SMIROW in your formula adds quality to your product . . . quality your customers can see. The dark particles of SMIROW are plainly visible in mixed fertilizers. And your salesmen will be proud to point them out!

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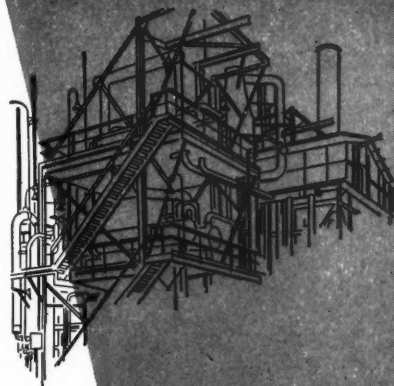
MAKES PLANTS GROW

SMITH-ROWLAND COMPANY

NORFOLK, VIRGINIA • GRANITE CITY, ILLINOIS

*U. S. Industrial Chemicals Co.
announces the opening of its new
Synthetic Ammonia
and Fertilizer Nitrogen
Solutions Plant
at Tuscola, Illinois*

January



1955

This new strategically-located plant in Tuscola, Illinois produces 50,000 tons per year of anhydrous ammonia. Part of it is converted into nitric acid which is transformed into ammonium nitrate by reaction with more ammonia. In turn the ammonium nitrate is used in the manufacture of nitrogen solutions composed of nitrate and ammonia in water.

The new unit is adjacent to the USI sulfuric acid installation which came onstream in September, 1953. Thus two of the most important chemicals for agriculture are available from this plant site.

The USI ammonia plant goes onstream in time for heavy springtime demand

for fertilizer nitrogen. It is an economical source for consumers in Illinois, Indiana, Ohio, Michigan, Wisconsin, Minnesota, Iowa and Missouri.

Included in the products to be available from this plant are both commercial and refrigeration grades of anhydrous ammonia and all formulations of ammonium nitrate — ammonia solutions. Special formulations can be tailored to the user's requirements.

For further information about how this new plant can serve you, please address your nearest USI office, or communicate with Chemical Sales, U.S. Industrial Chemicals Co., 99 Park Ave., New York 16, New York.

U.S.I.

INDUSTRIAL CHEMICALS CO.

99 PARK AVE., NEW YORK 16, N. Y.

Division of National Distillers Products Corporation
Branches in principal cities

The Will To Do It

by Joe E. Culpepper

Vice President-Sales, Spencer Chemical company

WE LIVE in a selling age. Nothing much happens in our present culture until somebody sells something. The tangled web of the salesman's varied and interesting activities reaches back into the very heart of the laboratories, work shops and factories of all segments of our industrial life.

Someone has observed that the future of our country is largely in the hands of two men—the researcher and the salesman. The salesman serves as the interpreter between the man who invents or discovers a product and the millions who use it. Without this interpreter or mediator, progress would be curtailed immeasurably.

Worthy, Honorable Profession

Being a salesman is a worthy and honorable profession—don't let anybody ever convince you otherwise. Not only do we live in a selling age in which the salesman's efforts, in a very great measure, mold our industrial life, but we live also in an age in which the standing of most professional and business leaders is determined by the quality of their salesmanship. For instance, who are the most sought after and best paid doctors, lawyers, school administrators, ministers, community leaders? They are the best salesmen in our city or our community. Any of them could do a good job selling fertilizer.

During almost its entire existence, our young sales organization has been in the strange—but perhaps, wonderful—situation of having more customers than goods to sell them. But no longer! Today we stand faced with the necessity of being lowered into the cage to face the angry, growling, gnashing teeth of hot competition. The time has come when each of us must give an account of his skill in battle.

'Will to Do the Job'

What do we need to win this fight? In thinking about the problems, it occurred to me the one thing we must have, ranking in importance far above and

Culpepper's address at his company's annual sales meeting has always been worthy of a wider hearing than that of the 84 men comprising his sales group, and FARM CHEMICALS has printed his talks on two previous occasions. Herewith, we present the 1954 address, edited to apply to all salesmen in the farm chemicals field.

beyond all the individual skills and techniques, is the will to do the job. It is a well considered conviction of mine that when intelligent men, properly trained for a job, become endowed with an inspired joy of participation, and resolutely determine in their minds to accomplish that job, there is almost no force on earth

that can stop them short of their goal. It was Goethe, greatest of the German poets, who said, "He who is firm and resolute in will molds the world to himself." On the other hand, uninspired men, possessing no resolution or determination, stand in pathetic helplessness as a monument to certain failure.

In casting around for a story to put in proper perspective what I want to say, I was unable to find anything half so apt or to the point as that old story found in an interesting chapter of ancient Jewish history, as recorded in the book of Judges in our Bible. The leader of the Army of the Israelites at that particular time was a man by the name of Gideon. This man was really a judge, possessing no great skill in the science of warfare, but he had great insight into human behavior. At the time of this story, he and the 32,000 men of his army were stationed on Mt. Gilead, while out in the valley before them lay a great host of Midianites and Amalekites. The story says the enemy were in numbers as grasshoppers, like grains of sand by the seaside.

The old Patriarch looked his situation over and pondered what he should do. According to the story, he came up with as fine an example as I have ever read of selecting the right men, devising sound strategy and then relying on the power of sheer determination to get the job accomplished. First, Mr. Gideon called his 32,000 men together and said something like this: "This is no job for sissies and weaklings. The enemy is out in that valley like flies. The task ahead calls for genuine courage, so all of you who feel the least bit nervous or afraid just leave the camp and get out of the way." Well, right off the bat, 22,000 of his men admitted their lack of courage and slipped away

into oblivion. History seldom records the activities of fainthearted men.

But the great old judge of Israel still was not satisfied as to the 10,000 that remained. For security reasons best known to himself, he wanted to test them further. To do this he marched them down to the river to observe how they drank. Three hundred alert and wide-awake soldiers scooped up water in their hands to drink it, while the other 9,700 slap-happy individuals, who didn't give much of a darn about what happened, prostrated themselves leisurely on the ground and drank directly from the stream. To this last group of 9,700 Gideon said, "Go on home, boys, I won't be needing you any more. You're not cowards, but you simply don't have the type of alertness and determination I am looking for."

Gideon now had his men, less than one per cent of his original army. To each man he gave a trumpet, a pitcher and a lighted lamp. The lamp was placed inside the pitcher to shield its light from view of the enemy. The 300-man army was then divided into three companies, of 100 men each, and went forth under cover of darkness to surround the enemy. And right here the Good Book uses an expression I especially like. It says, "They stood every man in his place." When the leader gave the signal, every soldier broke his pitcher to expose his lighted lamp, and then let go with a terrific blast on his trumpet. The Midianites and Amalekites, startled as they were aroused from a deep sleep, and seeing all the lights and hearing all the noise from the trumpets, thought they were surrounded by a tremendous army. Being caught off guard, and thus unprepared, they cried and stampeded and fled. Thus, we see many thousands go down to ignominious defeat because they had been outfoxed by 300 men who had the will and the courage to conquer. What an apt and inspiring story for us today. There is no need for me to take your time to apply this story to our own situation. All of us will see the parallel. Though few in number, we members of the sales organization are charged with the responsibility for a really large task.

Small, Inspired Group Preferred

Under today's competitive conditions, I would rather have a small sales team of inspired, resolute and determined men, with no more than a high school education, than dozens of confused, timid, uninspired and helpless college graduates. The desired goal, of course, and one I am sure we have accomplished, is to have well-trained men, saturated from head to toe with a knowledge of what they want to do and the will and determination to do it.

I stand constantly amazed at what an individual can do, even under the greatest of handicaps, once he has decided what he wants to do, and then wills to do it. Some of the most fascinating stories in history are woven around the success of individuals who overcame great obstacles and reached their pinnacle of success as a direct result of their resolute will.

In my opinion, one of the greatest men of the South during the past seventy-five years was Dr. George Washington Carver, until his death a few years ago associated with Tuskegee Institute in Alabama. Born

a slave, and never knowing his father or mother, he was a sickly colored boy who had no opportunity—no, not the faintest opportunity—to rise above his poverty and squalid surroundings. No opportunity, but George Washington Carver did rise. He longed for an education and grasped every opportunity to learn. Because he was a negro, a former slave and poor, he was refused admittance to many colleges. His unlimited will spurred him on, and finally he was admitted to Simpson College in Iowa and later to Iowa State College at Ames. He paid his expenses by doing odd jobs, mostly doing laundry for other students. After he received his degree, he returned to his native Southland to invest his humble spirit and noble life in research for improving the lot of his fellow countrymen, both colored and white. Because of his great will to do it, George Washington Carver has become a legendary figure of the South.

Another figure in history that has always inspired me was the notable Jewish Prime Minister of England, Disraeli. Though he was to become one of the most memorable speakers in British Parliamentary history, his early efforts in speech-making were complete failures. His maiden speech before Parliament was greeted by jibes and jeers. As he was hooted from the floor, he remarked, "I shall sit down now, but the time will come when you will hear me." Disraeli was a Jew, wore gaudy and extravagant clothes, was high-tempered and impulsive, but he had the will to learn to speak and how to relate himself to his associates. Oh, the power of the will to do it!

Yes, gentlemen, we are confronted in the days ahead with severe competition. Merely average or ordinary efforts will not get the job done. But what man in our industry would want no more than an average or ordinary task? Our spirits are in tune with the opportunities that rise above the horizon.

High Aims

Let me urge you, as I urge myself, to make no little plans. Small ideas and small plans have no power to stir men's souls. The high aims and noble aspirations we stamp within the hearts of other men will never die, but will live on long after we are gone. On the other hand, the little thoughts we think, the little plans we make, the little jobs we do will never see the light of tomorrow's sunrise. This hour of unparalleled technological development calls for men and women of vision for the future. Our sons and grandsons will do things that would stagger our imaginations today. Only by knowing what our job is and then willing resolutely to do it can we hope to live on in the memories of those who follow in our footsteps.

To a very large degree I agree with Schiller, another German poet and philosopher, who stated, "Everyone stamps his own value on himself—the price we challenge for ourselves is given us. Man is made great or little by his own will."

So, in closing, I would point to a great and challenging job that lies ahead. It is not a day or an hour for those who feel it cannot be done. This is the hour for the world to be able to say, "They stood, every man in his place." The future looks bright to me, and I am rarin' to go. ♦

DUST SEALED SCALE BOX
WITH OIL SEALED LEVER SYSTEM

CUSTOMER'S SUPPLY HOPPER
AUTOMATIC OILER
AIR REGULATOR
AIR FILTER

THE PLANT THAT DEMAND BUILT—Union's I & C Bagger is manufactured in this new Ingle & Corley plant, located in Augusta, Ga. Increased capacity insures prompt delivery of all models.

HOPPER VIBRATOR
SUPPLIED WITH MACHINE
DOUBLE BEAM SCALE — MICRO SWITCH
FLEXIBLE DUST SHIELD
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ALL SCALE PARTS DUST SEALED

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MODEL UB 100-A (DOUBLE BEAM SCALE)

for accurate high-speed
weighing and packing of
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CALIBRATED DOUBLE FACE, DIAL HEAD

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INSTANTANEOUS CHANGE FROM
ONE WEIGHT UNIT TO ANOTHER
BY SELECTOR SWITCHES

ALL SCALE PARTS DUST SEALED

FLEXIBLE DUST SHIELD

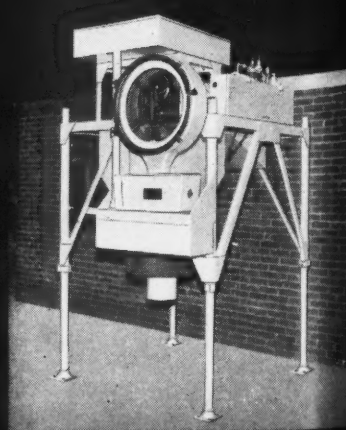
ADJUSTABLE BAG SPOUT

ADJUSTABLE TUBULAR LEGS

CUSTOMER'S SUPPLY HOPPER
HOPPER VIBRATOR SUPPLIED WITH MACHINE
AIR REGULATOR
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DUST SEALED AUTOMATIC CONTROL BOX

MODEL UB 101 (DIAL SCALE)

for finer weight tolerances
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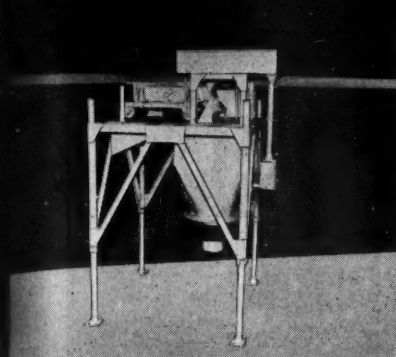
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SIMPLIFIED INSTALLATION—Shipped completely factory assembled and checked. Can be installed in a matter of hours. Adjustable legs may be compacted. Unit can be readily moved into position and quickly adjusted to the supply hopper.



TRAINED UNION TECHNICIANS — The I & C Bagger is installed and serviced by Union Bag machinery experts. These technicians are based so that they are available for immediate assistance if needed.



500 TONS PER 8-HR. DAY—Completely automatic filling and weighing cycle. Close weight tolerance. Low in both initial and operating costs. Make your own comparison with any other packer.

MODELS OF UNION'S I & C BAGGER HELP OBTAIN RECORD SAVINGS

IN THE AUTOMATIC WEIGHING AND BAGGING OF FEED, FERTILIZERS AND GRANULAR CHEMICALS

Finer accuracy, increased operating efficiency and convenience, and greater ease of installation have been incorporated in new Models UB 100-A and UB 101.

Performance records prove that the I & C Bagger substantially reduces packaging labor costs, increases production, and can bring about important economies in the cost of the Multiwall bags themselves.

SAVINGS OF OVER \$50 A DAY

Typical of how the I & C Bagger improves packaging efficiency is the experience of a small fertilizer plant which is saving over \$50 a day in reduced manpower

and increased production, with a single machine. This manufacturer's newly developed capacity to service and load trucks faster has enabled him to add many new accounts.

ADD NEW UNITS; CONVERT MORE PLANTS

A major producer of plant food installed ten additional I & C Baggers and has just ordered two more. Another leading manufacturer has now converted nine plants to the I & C Bagger. Still another processor credits this outstanding new packaging unit with transforming a previously inefficient plant into a profitable one.

I & C Bagger

*Automatic Weighing
and Filling Machine
for Open Mouth Bags*

Manufactured by **INGLETT & CORLEY, INC., AUGUSTA, GA.**

Exclusive sales agents:

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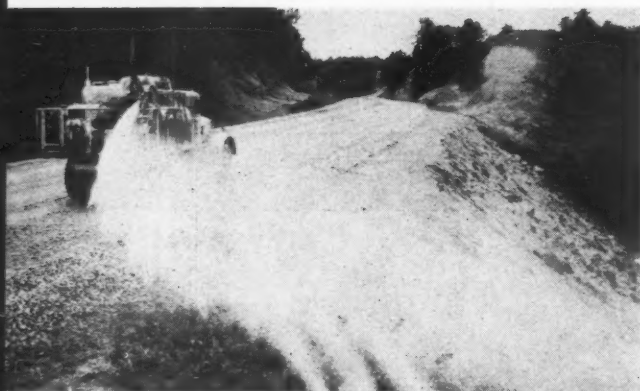


**MULTIWALL
PACKAGING
MACHINERY
DEPARTMENT**

Woolworth Building, New York 7, N. Y.

Fertilizer on the Turnpike

Photo Courtesy Nitrogen Division



Here's the spray rig in operation. With Mendel's method \$500,000 was trimmed from estimated landscaping costs.

WEST Virginia's new Turnpike hardly seems a likely farm chemicals story, but there is an interesting plant food connection.

Try to visualize the renovation of erosion control areas or waterways with two rigs—utilizing straw, asphalt, seed, water and, of course, fertilizer. To the best of our knowledge the method hasn't been used as yet but, based on results obtained along the Turnpike, the idea has possibilities for agricultural use.

Rugged terrain typifies much of the country through which the roadway has been chiseled along a route from Princeton to Charleston. Some idea of the work involved can be gained from figures showing that some 8,000 men, 30 contractors, a variety of special equipment and some 15 million pounds of explosives were used on the job.

Overcoming Rock and Soil Slides

Slides of rock and soil were one of the big headaches that had to be overcome, and to keep the towering banks where they belonged, it was decided that grass should be established along the roadsides and even the cliffs which are composed mostly of shale and loose soil.

The job of growing the grass involved some special methods developed by Maurice A. Mendel, supervisor

of roadside development for the West Virginia Turnpike Commission. In solving the problem, he was able to trim estimated costs of landscaping from \$750,000 to \$250,000.

Two major problems had to be solved—holding seed on the inaccessible, steep cliffs and making it grow on patches of soil among the shale and rocks.

Mendel's Plan

Mendel's plan involved first of all the placement of a straw mulch over all areas slated for seeding. To accomplish this he turned to a truck-towed machine known as the Mulch Spreader, a unit sold by the Finn Equipment co., Cincinnati, Ohio. This rig can chew up three bales of straw every two minutes, shooting the pieces out through a pipe for distances up to 75 feet.

At the end of this delivery pipe are three nozzles that spray a fine mist of emulsified asphalt on the straw as it emerges. The straw and asphalt blend in the air and hit the ground plastered together.

Within minutes the asphalt droplets are semi-dry and are able to hold the straw on slopes under severe weather conditions. In West Virginia, treated areas have been subject to 50 mph winds and, on one occasion, a 3.21 inch rainfall.

A second crew utilizes a spray rig to place on the straw-asphalt mulch a mixture consisting of 125 pounds of seed (native varieties), 640 pounds of Arcadian 12-12-12 from Nitrogen div. and 850 pounds of water.

The mulch holds in place both soil and seed, water assists germination and growth, fertilizer produces the needed push, and within a few days to a week the grass begins to do its job, retaining the mountain sides.

"This method of seeding, using water, native grasses and Arcadian," commented Mendel, "gives us results we never had in the past."

Through using the method, Mendel and his crews have been able to grow grass on every type of ground encountered along the Turnpike, with the exception of solid rock and usual West Virginia outcroppings of coal. ♦

Placing the straw and asphalt mulch with mulch spreader. The unit is sold by the Finn Equipment co., of Cincinnati, Ohio.



Maurice Mendel on top of spray rig with bags of fescue grass and fertilizer.



Roadside bank 10 days after application. Grass can be seen forming darker colored patches growing up through the straw.



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Seasonal Application

INDUSTRY, like agriculture, is faced with constant change. For example, consumer buying habits are never static but in a constant state of change. Education, income, advertising and many other forces create buying trends. So perhaps if we work closely together we can hasten the development of a new trend on seasonal application of plant food that will benefit the farmer, the industry and be of credit to the experiment stations.

You know the normal movement of plant food from the factory is closely related to the planting periods. The consequent result at the manufacturing level is four to seven months of activity and a comparatively long period of inactivity, particularly where winter grains are not grown.

True, the return to the farmer's "normal" fertilizer purchasing habits is of recent vintage—within the past three years—but the outlook because of expanded raw material production indicates a period of "plant food aplenty" for many years to come.

A rule of thumb measurement for this "normal" plant food movement is 70 per cent in the first six months of the calendar year and 30 per cent in the last six months. Leveling of any kind—for example, a 60/40 proportion, could have but beneficial effect.

The reasons are obvious because when production is spread on a more even basis, plant capacities are more economically used, sales expenses are reduced; in fact, all expense factors are affected. The net



By **W. F. Price**
Plant Food Division
Swift & Company

benefits would be a reduction in the cost of doing business that would reflect itself in lower product prices to the farmer.

Benefits

His benefits will not be limited only to lower prices; he can also include the advantages of better cured goods, a complete choice of grades and dependable delivery service.

The question that concerns us most at the moment is, how far can we go in fall application for spring planted crops? Is it still in or is it out of the experimental stages? Is it wasteful or does it make the farmer money? If sound, how fast can it be developed? I think we can agree that the fine work done in many states on the program, including Wisconsin, Minnesota, Iowa and Missouri, indicates vast possibilities ahead.

But industry wants to know how far the program can be expanded—is it suitable, for example, for all the area north of the Ohio river and east of the plains states? Also is it suitable on sandier soils in the Northern tier of states or is it economical only on heavier soils in any latitude? These are questions that both the farmer and industry need to know so that we can gear our respective production programs accordingly.

Agronomists have already well established that plant food can be profitably applied in the fall to legumes, pastures and winter grains. Now—if corn can be pre-fertilized in late fall, that is all we have been waiting for.

What Industry Can Do

What can we, the industry, do to help agronomists promote the fall application program? Individually we can do a lot when we have the facts.

In those areas where the practice is sound, we can adopt the agronomists, program by sales contact with the farmers, the dealers, by advertising messages, by direct mail letters and every other means at our command.

Collectively we can do much more; we have our fine industry associations—the National Fertilizer Association and the American Plant Food Council—set up to help. We have our regional associations, such as the Midwest Soil Improvement Committee.

There are some members of this industry who support the work with fellowships and grants-in-aid, in line with the industry's capacity to invest in outside research.

We can go to the bankers and demonstrate that here is a program that deserves farmer loans. It is a

From a paper presented before the American Society of Agronomy meeting in Saint Paul on Nov. 11, 1954.

safe assumption we can count on their support. The banking profession has virtually grabbed the ball, and why not—since plant food protects the dollars they loan.

The farm press deserves more than a hearty slap on the back for the splendid way it has cooperated with both the agronomists and industry in the promotion of sound fertility programs. The farmer is an avid reader of agricultural journals and not only places reliance on, but frequently puts into practice what he reads.

How fast we progress on this newest venture of seasonal application will depend upon research and our ability to sell the products of this effort.

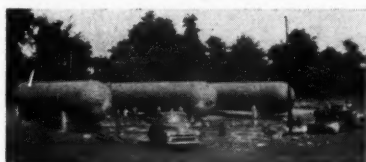
It looks like a "natural" and I hope it is. While industry benefits, the farmer is the final benefactor since the benefits pass directly to him in the form of better plant food and lower prices. ♦

S & R Installs NH₃ Bulk Plant

A new anhydrous ammonia fertilizer storage plant which has been installed by the S & R Gas co. near Natchitoches, La., marks the entry of the company, which deals in butane, propane and home appliances, into the NH₃ field.

Ammonia for the plant, which will serve the surrounding agricultural district, is supplied through a contract with Lion Oil co. and tanks were manufactured by the K. B. Beard corp.

The company plans to sell its customers on services and conveniences, delivering ammonia to their



S & R Gas Co. storage plant

properties. For safety reasons, tractors and trailers will be used in order to eliminate any unnecessary highway exposure.

Albert Stephens is company president; F. L. Robertson, secretary and general manager and D. B. Thaxton, branch manager. ♦

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by Dr. Melvin Nord

PATENT REVIEWS

Apparatus for Making Organic Fertilizer

In U.S. 2,695,218, issued Nov. 23, 1954, Eric W. Eweson (Newport, R.I.) describes an improved apparatus for making organic fertilizer by the decomposition of moist organic material through the propagation of aerobic bacteria in it, in which air is forced up through the mass and spent air and gases are withdrawn at intervals through the mass. His original patent was U.S. 2,474,833.

The apparatus is shown in Figs. 1 and 2, and consists of a rectangular tank 1 containing a number of vertically spaced grids each of which consists of a number of spaced bars 2 set on edge and supported on the walls of the tank. Two scraper blades 3 rest on the bars of the grids; these blades are provided with bevelled edges 4. Each blade is connected to chains 6 and 7 which extend through ports 5 in the walls of the tank, so that the blades may be moved from the outside.

The nature of the material placed in the tank is such that it tends to bridge the space between the supporting bars so as to sustain

the load without preventing free flow of air through the material. As the decomposition proceeds, the material is advanced from one chamber to the chamber below; the bridged material is broken up by operation of the scraper blades and allowed to drop down between the bars to the next lower chamber.

Prevention of Plant Growth with Arylic Sulfides

U.S. 2,695,224, issued Nov. 23, 1954 to Arthur H. Schlesinger, assigned to Monsanto Chemical co., provides a new herbicide containing phenyl sulfide or analogous compounds.

Herbicidal compositions containing the sulfide are obtained by first preparing a solution of the sulfide in an organic solvent such as cyclohexane, and then adding the resulting solution to water containing an emulsifying agent such as alkylbenzenesulfonates, to form an emulsion. The concentration of sulfide in the emulsion is about 0.1 to 2 per cent by weight.

The emulsions may be used to destroy already existing plant growth by direct application to the plants by spraying, or the emulsions may be applied to media which normally support plant growth, such as in parking areas, highway abutments, railway yards, etc. Generally, spraying the soil surface is sufficient to prevent plant growth.

Herbicide Composition

It is now customary to market

2,4-D and 2,4,5-T and mixtures of these to be used as weed killers in the form of amine salts. These salts are mixed in the field with a suitable proportion of water to give a solution having the desired spray concentration. When the water is hard; i.e., contains more than 45 ppm. of dissolved calcium or magnesium salts of the polychlorophenoxyacetic acids precipitate out and reduce the effectiveness of the herbicide activity.

In U.S. 2,694,625, issued Nov. 16, 1954 to John C. R. Warren and assigned to Union Carbide & Carbon corp., this precipitation is minimized or avoided by the addition of certain tri-basic amine citrates.

Herbicidal Compositions

U.S. 2,695,225, issued Nov. 23, 1954 to Eugene D. Witman and assigned to Columbia-Southern Chemical corp., discloses the use of isopropyl N-3-chlorophenyl carbamate as a herbicide.

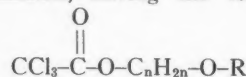
The carbamate is prepared by the reaction of isopropyl chloroformate and meta-chloroaniline in the presence of an alkali, at 0 to 10°C.

The carbamate may be prepared as a liquid formulation by dissolving it in a solvent such as xylene or an alcohol, together with a wetting agent, or it can be used in a solid or dust formulation. The solid formulation is prepared by spraying the carbamate onto a highly adsorptive diluent such as adsorptive silica. The coated diluent is then further diluted by blending with a solid diluent, such as clay, talc, etc. The solid formulations may be made wettable by the addition of a wetting agent.

Composition for Control of Undesirable Vegetation

U.S. 2,693,407, was issued Nov. 2, 1954 to Arthur W. Swezey, and assigned to The Dow Chemical co.

It has been discovered that the trichloroacetates of the chloroaryl-oxyalkanols, having the formula



where n is 2 or 3, and R is a chloroaryl radical, suppress the growth of vegetation. The patent gives ten examples of the use of such compounds. ♦

Figure 1

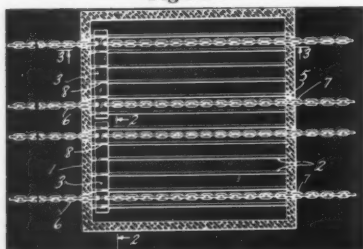
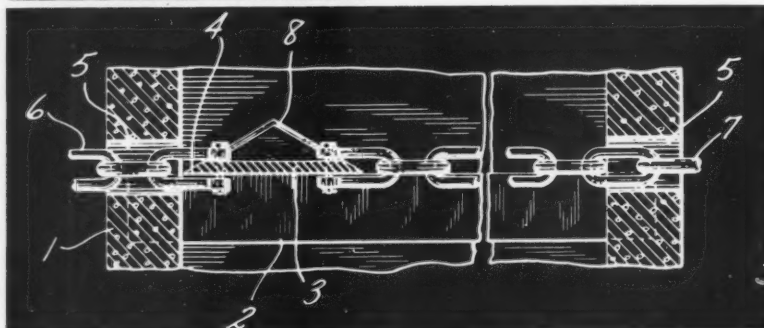


Figure 2



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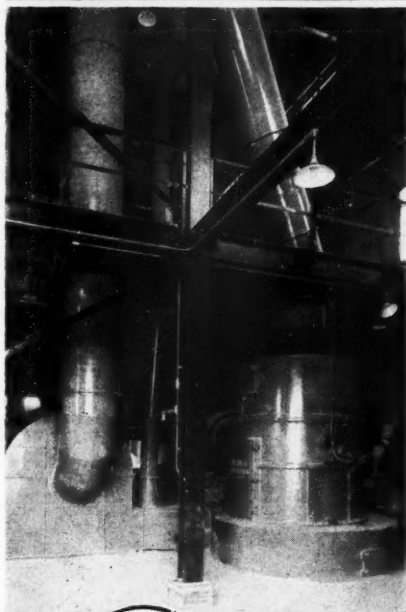
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PEST REPORTS

Boll Weevil Hibernation Reports

Examination of ground trash samples collected during the fall months of 1954 has now been completed in several states. Although the boll weevil problem will depend largely upon the number of weevils which survive the winter as well as conditions after emergence, the data collected to date would indicate in most cases about an average or below average boll weevil population for the beginning of the coming season. A similar survey will be conducted in most of the areas during early Spring to obtain survival data.

The trash samples, in most instances, were collected jointly by the Cotton Insects Section, Entomology Research Branch, and personnel of cooperating agricultural agencies in the states concerned. With the exception of Georgia and Tennessee, all samples were processed by the Cotton Insects Sec-

tion. In Georgia all work was performed by the University of Georgia Experiment Station and Extension Service and in Tennessee by the Insect and Plant Disease Control office of the State Department of Agriculture.

Louisiana Counts

Counts from Madison parish, La., show the 1954 fall average to be 1.1 times the average for the past 18 years. The number of live weevils per acre ranged from 242 to 7,502 with the average being 2,686. In the 18 years during which hibernation counts have been made, the following six have a higher average than 1954: 1942, 1945, 1946, 1949, 1950 and 1953. Trash samples for which no comparative data are available were taken at two points in each of the parishes of Ouachita, St. Landry, Avoyelles, Red River and Bossier. Live boll

Presented in cooperation with the Economic Insect Survey Station, Plant Pest Control Branch, Agricultural Research Service, USDA.

weevils collected in these parishes averaged 1,548 per acre.

In McNairy county, Tenn., an average of 311 live weevils per acre was found. This compares to an average of 31 in 1953; 2,259 in 1952 and 239 in 1951.

Trash examinations were made in four regions of Georgia. The 1954 fall average was 99 live weevils per acre of surface trash as compared with 1,984 in the fall of 1953. The breakdown by areas follows: northwest, 290 live weevils per acre; north central, 68; east central, zero and south, 48. Live weevils were found on only 14 per cent of the 49 farms examined. This is the lowest fall count in Georgia since records were started four years ago.

The Carolinas

The number of boll weevils per acre found in surface trash examined in Florence county, S. C., ranged from zero to 11,132 with all samples averaging 2,299. This compares with an average of 3,533 per acre in the fall of 1953 and an average of 4,355 per acre for the 12-year period in which examinations have been made in the county. Darlington county counts from six farms ranged from zero to 4,840 per acre with an average of 2,097.

Trash collections were made from five farms in each of nine counties in North Carolina for boll weevil hibernation counts. The average number of live weevils per acre for all samples was 1,334 with county averages as follows: Sampson 2,904; Cleveland 290; Rowan 1,549; Halifax 2,614; Scotland 968; Hoke 484; Franklin 1,065; Wilson 2,130 and Harnett none. Under date of Jan. 5, 1955, George D. Jones, North Carolina Extension entomologist, issued a statement to the effect that the boll weevil carry over in North Carolina could be the lightest in recent years.

Virginia Collections

In Virginia surface trash was collected from 20 farms in three

Calendar

Feb. 1-3—Eastern States Garden Supply Show, 71st Infantry Regiment Armory, New York City.

Feb. 7—Tenn. Seedmen's Assn. annual meeting, Andrew Jackson hotel, Nashville.

Feb. 7-9—Southern div., American Phytopathological Society, Louisville, Ky.

Feb. 7-9—Assn. of Southern Agricultural Workers annual meeting, Louisville, Ky.

Feb. 8-11—Fertilizer-Seed Dealer meetings, Univ. of Tenn. Feb. 8—Andrew Jackson hotel, Nashville; Feb. 9—City Hall, Jackson; Feb. 11—McCord Hall, Univ. of Tenn. Farm, Knoxville. Feb. 10-11—Third annual Oregon fertilizer conf., Oregon State College, Corvallis.

Feb. 10-11—Crop and Soil conf., Oklahoma A&M, Stillwater.

Feb. 11—New York section, American Chemical Society, Symposium of Agricultural Chemical Development, Carbide & Carbon Bldg., New York City.

Feb. 14-16—Centennial Symposium "Nutrition of Plants, Animals and

Man," Mich. State College, School of Agriculture, East Lansing.

Feb. 17-18—Annual joint meeting, Midwestern agronomists and fertilizer reps., sponsored by Middle West Soil Improvement committee, Palmer House, Chicago.

Feb. 23-25—Ohio-Indiana conf., on use of aerial equipment in agriculture, Purdue University, Lafayette, Ind.

Feb. 23-25—Midwest Chapter, National Shade Tree conf., Chase hotel, St. Louis, Mo.

Feb. 28-March 1—Fertilizer section, Southern Safety conf., Jung hotel, New Orleans, La.

March 7-9—NACA Spring meeting Chase & Park Plaza hotel, St. Louis Mo.

March 8-9—Western Production conf. Hotel Westward Ho, Phoenix, Ariz.

March 22-24—National Farm Chemical Council annual conf., Columbus, O.

March 24-25—North Central States branch, ESA, meeting, East Lansing, Mich.

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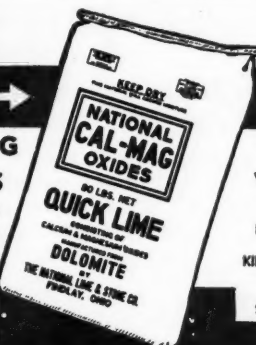
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counties. Samples from Southampton county had counts ranging from zero to 7,744 per acre with an average of 2,759. Brunswick county ranged from 968 to 4,356 weevils per acre and had an average of 2,130. In Mecklenburg county the counts ranged from zero to 968 with an average of 484 per acre. The average number per acre for all samples taken in Virginia was 2,033.

E. Corn Borer Hibernation Counts High in North Central States

Agricultural agencies in 25 states conducted surveys to determine the number of European corn borers that went into hibernation in the fall of 1954. The insect was not found in any new state; consequently, the number of known infested states remains 37. There were, however, new county records in several states increasing the number of known infested counties to 1,596. States reporting new county finds together with the number of counties involved follows: Arkansas 2; North Dakota 2; Oklahoma 2; South Dakota 4; Virginia 4 and West Virginia 2.

Hibernation Counts

Hibernation counts were made in 608 counties of the 25 states which conducted the survey. Counts in the North Central states showed a marked increase over those of the 1953 fall survey. Large areas through central Iowa, northeastern Nebraska and southeastern South Dakota had infestations of more than 500 borers per 100 corn stalks. Several counties in central Illinois were found to be in the same category. In most counties adjacent to this high population the counts were found to average between 300 and 500 borers per 100 stalks. See accompanying map. In the 13 North Central states the average number of borers per 100 plants was 223 as compared with the 114 found in the fall of 1953. All states in the group showed an appreciable increase except Kansas, Kentucky, North Dakota, Minnesota and Wisconsin. For the area as a whole 74 counties recorded populations of over 500 borers per 100 plants



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Patent No. 2,621,078



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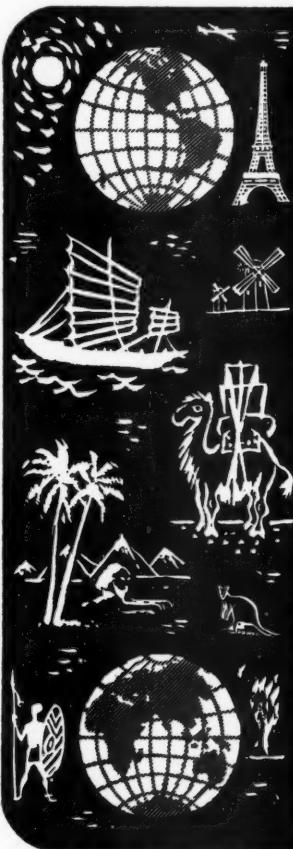
AND ALL OTHER FERTILIZER AND FEED MATERIALS



ESTABLISHED 1873
Woodward & Dickenson
Inc.

1400 SOUTH PENN SQUARE, PHILADELPHIA 2, PA., U.S.A.
TELEPHONE: LOcust 4-5600 Cable Address: "Woodward" TELETYPE: PH109

Branches in MADRID, MANILA, TOKYO, SEOUL, WASHINGTON, D. C., U. S. A.



European Corn Borer—Fall Abundance



as compared with 11 counties in 1953.

The Eastern United States grouped as a whole showed a substantial decrease over the previous year. In 1954, the average number of borers was 33 compared with 65 per 100 plants in 1953. The only states in this group which showed an increase over 1953 were Massachusetts and New Hampshire, and these were not necessarily significant. In the Eastern area only a few counties had counts of over 100 borers per 100 stalks.

Comparable Data

Comparable data for all the states surveyed showed an increase from 104 borers per 100 plants in 1953 to 186 in 1954. It might be of interest to review the comparable

populations recorded for surveys conducted since 1948. In 1948 the average was 95; 1949—283; 1950—80; 1951—63 and in 1952—72.

Weather Factors

It should be kept in mind that weather factors will play an important part in the final development of the 1955 European corn borer populations. Field losses in 1949 following the average fall hibernation population of 95 were estimated to be \$350,000,000, whereas in 1950 following a fall hibernation population of 283 estimated losses dropped to \$85,000,000. The present population in the North Central states could mean serious trouble for the 1955 growing season and the situation should be watched carefully. ♦

PRODUCTION

Phosphate Rock Up

In First Half 1954

Production of phosphate rock ore in the first half of 1954, according to the Bureau of Mines, totaled over 25.8 million long tons. Domestic marketable production rose nearly five per cent above the 1953 period to a new record high of over 6.8 million tons. Increases were reported in all three producing areas, Florida, Tennessee and the Western states.

Rock sold or used by producers in the US during the first six months was 7 per cent more than during the 1953 period with increases in Florida, Tennessee and the Western states of 6, 15 and 5 per cent, respectively.

Stocks of rock in producers' hands on June 30, 1954, rose 3 per cent above the first six months of 1953 to over 2.9 million tons.

October Superphosphate

October superphosphate production amounted to 180,503 short tons (100 per cent APA), according to the Bureau of the Census, up 18 per cent from the revised September output and four per cent above October, 1953.

Shipments of all grades totaled 119,977 tons, up 16 and 15 per cent respectively and stocks on hand at the end of the month were three per cent less than those held on Oct. 1, but four per cent more than Oct. 31, 1953.

POTASH
SUPERPHOSPHATE
UREA, 45½% & 46% N.
CALCIUM
AMMONIUM
NITRATE—20.5% N.
BAGS—
Paper and Burlap

ALEX. M. McIVER & SON

Brokers

Fertilizer Materials
Industrial Chemicals

P. O. BOX 155 Ph. 3-4828-29
CHARLESTON, S. C.

"Since 1915 your most efficient channel for sales
and purchases of Fertilizer Materials"

VITORGANIC
(Chicago Activated Sludge)
HYNITE TANKAGE
CASTOR POMACE
GROUND
COTTON-BUR ASH
(38-40% K₂O Potash)

Production — October, 1954

Compiled from Government Sources

Chemical	Unit	October		September
		1954	1953	1954
Ammonia, synth. anhydrous.....	s. tons	230,098	198,556	*210,938
Ammonia liquor, coal & coke (NH ₃ content).....	pounds	¹ 3,817,715	4,170,200	3,306,803
Ammonium nitrate, fert. grade (100% NH ₄ NO ₃).....	s. tons	¹ 142,833	122,412	129,915
Ammonium sulfate				
synthetic (technical).....	s. tons	78,602	41,707	92,201
coke oven by-product.....	pounds	139,492,818	158,749,700	126,997,854
BHC (Hexachlorocyclohexane).....	pounds	1,829,999	—	**2,609,094
Gamma content.....	pounds	337,871	—	**490,863
Copper sulfate (gross).....	s. tons	5,040	—	5,928
DDT.....	pounds	5,525,628	—	**6,444,083
2, 4-D Acid.....	pounds	—	—	—
esters & salts.....	pounds	1,163,819	—	**1,085,204
esters & salts (acid equiv.).....	pounds	905,977	—	**759,072
Phosphoric acid (50% H ₃ PO ₄).....	s. tons	² 245,893	235,137	*219,823
Sulfur, Native (Frasch).....	l. tons	453,660	430,891	439,244
Recovered.....	l. tons	28,400	27,000	*27,300
Sulfuric acid, gross (100% H ₂ SO ₄).....	s. tons	1,183,241	1,195,319	1,120,743
Chamber process (100% H ₂ SO ₄).....	s. tons	208,366	231,311	200,670
Contact process (100% H ₂ SO ₄).....	s. tons	974,875	964,008	920,073
Superphosphate (100% APA).....	s. tons	180,503	172,830	*153,368
Normal (100% APA).....	s. tons	130,085	134,259	*117,617
Enriched (100% APA).....	s. tons	2,180	—	2,455
Concentrated (100% APA).....	s. tons	46,816	37,503	32,811
Wet Base (100% APA).....	s. tons	1,422	1,068	485

* Revised.

** Partly estimated.

¹Includes quantities for 3 plants previously not reporting.

²Includes quantities for 1 plant previously not reporting.

STEDMAN FERTILIZER PLANT EQUIPMENT

Established in 1834

All Steel Self-Contained Fertilizer Mixing
and Bagging Units

Batch Mixers — Dry Batching

Pan Mixers — Wet Mixing

Tailings Pulverizers — Swing Hammer and Cage Type

Dust Weigh Hoppers

Vibrating Screens

Acid Weigh Scales

Belt Conveyors — Stationary and Shuttle Types

Bucket
Elevators

Batching Hoppers

Hoppers
and Chutes

STEDMAN FOUNDRY & MACHINE COMPANY, INC.

Subsidiary of United Engineering and Foundry Company

General Office & Works: AURORA, INDIANA

MONARCH SPRAYS



This is our Fig. 645 Nozzle. Used for Scrubbing Acid Phosphate Gases. Made for "full" or "hollow" cone in brass and "Everdur." We also make "Non-Clog" Nozzles in Brass and Steel, and
Stoneware Chamber Sprays now used by nearly all chamber spray sulphuric acid plants.

CATALOG 6-C

MONARCH MFG. WORKS, INC.

2501 East Ontario Street, Philadelphia, Pa.

SHUEY & COMPANY, Inc.

Specialty: Analysis of Fertilizer Materials and Phosphate Rock. Official Chemists for Florida Hard Rock Phosphate Export Association. Official Weigher and Sampler for the National Cottonseed Products Association at Savannah; also Official Chemists for National Cottonseed Products Association.

115 E. BAYSTREET, SAVANNAH, GA.

Dictionary of Fertilizer Materials & Terms \$1.00 postpaid

The reference booklet of all who are interested in production and use of chemical fertilizers.

Farm Chemicals, 317 N. Broad St., Phila. 7, Pa.

FERTILIZER MATERIALS MARKET

New York

January 12, 1955

Ammonium Nitrate: Supplies of ammonium nitrate are more plentiful than at this time last year and buyers, knowing this, are holding off taking delivery. A better movement is expected, however, very shortly as the fertilizer shipping season really gets under way.

Nitrate of Soda. No new price changes have been noted since the recent price reduction. Stocks are ample to take care of expected demand.

Urea. Limited amounts of foreign material arrived from time to time and the market was quoted nominally at \$115 per ton, f.o.b. Atlantic ports. Another new producer of domestic urea is expected to start operations shortly, which will increase the supply situation.

Nitrogenous Tankage. With most domestic producers sold out for this season and very little imported material arriving, supplies were rather tight and high in price. The market was considered to be \$5 to \$5.50 per unit of ammonia (\$6.08 to \$6.68 per unit N), f.o.b. shipping points.

Castor Pomace. While no offerings were available at present, the market was quoted at from \$35 to \$37.50 per ton, f.o.b. production points. Few offerings were noted of imported castor pomace, and the market was in a rather strong position.

Organics. The demand picked up for organic fertilizer materials in the last week as the heavy fertilizer mixing season approached, and many buyers found themselves without sufficient supplies on hand. Blood sold at \$6.75 per unit of ammonia (\$8.20 per unit N), f.o.b. Eastern points and animal tankage sold at \$6.25 (\$7.59 per unit N), f.o.b. New York. Soybean meal was steady in price at \$67 per ton, f.o.b. Decatur, Ill., in bulk. Linseed meal sold at \$73 per ton, f.o.b. Buffalo for January shipment in

bulk. Cottonseed meal was in limited demand from the feed trade.

Fishmeal. Offerings were limited mostly to imported material with occasional arrivals at various ports. Demand from the fertilizer trade was very limited for fish meal.

Bone Meal. This material remained in tight supply, with offerings limited. Demand from both the fertilizer and feed trade continued good. Imported feeding grade bone meal was available at around \$72 per ton at Atlantic ports. There were no offerings of raw bone meal.

Hoof Meal. This market was in a well sold up position with last sales made at \$7 per unit of ammonia (\$8.51 per unit N), f.o.b. production points.

Low Grade Organics. Supplies were normal for this time of year and this market was rather featureless with most producers under yearly contracts.

Superphosphate. With supplies of both normal and triple superphosphate on the plentiful side, buyers are only ordering for their immediate needs. This may possibly produce a bottleneck in March or April regarding shipments.

Potash. While some producers reported a pick-up in the movement of potash from the mines, others stated shipments were behind last year with a good many buyers waiting until the last minute to order supplies. A hearing in Washington shortly on imported potash is expected to clear the air regarding imported material.

Philadelphia

January 13, 1955

There is a little more firmness to the raw materials market, but this is purely seasonal. There are ample stocks of inorganic chemicals, and the production of blood and tankage is well ahead of the demand. Castor pomace is still very scarce. Potash is moving on a little better

than average basis for this season of the year.

Sulfate of Ammonia. The market is somewhat firmer due to export movement, and the foreign demand is reported good. Domestic inquiry is improving and stocks are quite ample.

Nitrate of Ammonia. Production is well ahead of last year and inventories are heavy. Demand is rather quiet—quite different from previous seasons.

Nitrate of Soda. There is some rather early demand for direct application, and deliveries are picking up. No price changes are reported.

Blood, Tankage, Bone. Increased production of blood and tankage has eased the market considerably, and demand is rather slow. These products are priced more or less nominally at \$6.75 (\$8.20 per unit N) for blood, and \$6 to \$6.50 (\$7.29 to \$7.90 per unit N) for tankage. Steamed bone is strong and not too plentiful at \$70 to \$72.50 per ton.

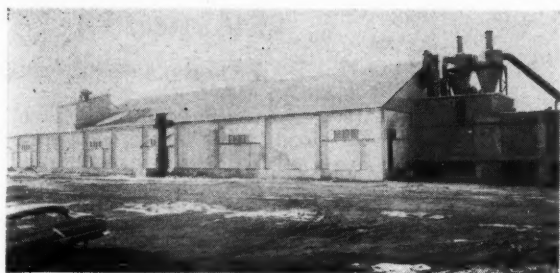
Castor Pomace. This continues to be extremely scarce, with latest suggested price \$37.50 per ton, which is purely nominal.

Fish Scrap. Market is nominally \$145 to \$150 per ton for menhaden meal, and \$140 to \$145 for scrap. The supply is scarce and there is little or no demand.

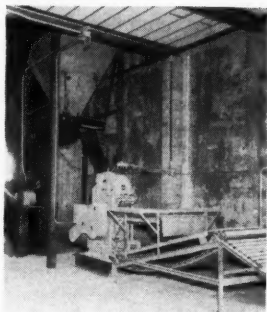
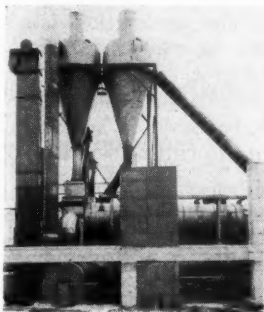
Phosphate Rock. The demand from acidulators has picked up, and there is fairly good export inquiry. No price changes are noted.

Superphosphate. The demand from mixers is picking up and movement is more active. However, stocks continue to accumulate. Inquiry for triple grade is improving.

Potash. Inquiry is rather slow but shows signs of betterment as mixers are beginning to order in larger volume for the Spring trade. Stocks are adequate and prices unchanged.



TOP: Exterior view of the Spencer Plant Foods Building located at Spencer, Iowa. **BOTTOM LEFT:** Blue Valley fertilizer granulator number 16 being installed. **BOTTOM RIGHT:** An interior view of plant bagging station.



High-N Granulated Fertilizers from New

Spencer Plant Foods

HIGH-nitrogen, granulated fertilizers are now being produced at the new plant of Spencer Plant Foods, Inc., located in Spencer, Iowa. Featuring a Blue Valley fertilizer granulator no. 16 and engineered and equipped by the Blue Valley concern, the operation has an annual capacity of 25,000 tons of plant foods for farmers in the northwestern part of the state.

Facilities

It is constructed with poured concrete floors and walls and, in framing the bin structure, railroad rails have been utilized. Designed for simplicity and flexibility, the plant has receiving, manufacturing-granulating and bulk and bag shipping units. During rush seasons they can be operated simultaneously on a 24 hour basis and, in slack periods, each operating division can be run separately. All nitrogen for the high-N goods is obtained from ammonium nitrate solutions.

Personnel

Personnel of the new organization, in addition to President Fred Sherer, includes Bob Cloud, plant production manager, and Frank Powers, sales manager. The company is owned and operated by fertilizer men and citizens of the Spencer area.

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More on Tolerances

ACCORDING to our Washington editor, John Harms, regulations and tolerances for pesticide residues on fruits and vegetables will soon go into effect. It is hoped that before such rulings are issued the comments of the National Agricultural Chemicals Association and those of chemical companies submitted to the Department of Health, Education and Welfare will be properly reviewed and considered.

In his report on page 30, Harms covers some of the more important recommendations submitted by NAC and the pesticide producers. There is little to be gained by re-hashing the data here; however, we will add some additional views of the association as included in its statement.

On the whole, NAC found the original rulings "generally well considered," adding that more modifications and changes will result as practical experience is gained.

NAC pointed out, in its statement, that the opinions and recommendations of advisory committees will not benefit only the petitioner but are of value to the government and the general public as well. Therefore, said NAC, the costs of such panels should be borne jointly by the petitioner and the government.

Assignment as a panel member won't necessarily be a soft touch if another NAC recommendation is approved. It suggests that a limit of \$500 in consultation fees be set for each committeeman as adequate compensation for about 10 or more full working days. This should provide time enough for study and report on submitted data.

NAC also pointed out that, as the rulings are now set up, there could be considerable delay in operation of the committees and a subsequent disruption of time schedules provided for in the law.

As presently stated, the beginning of the 60 day period (90 when required) for consideration of a petition begins at "the date of acknowledgement" of receipt of the petitioner's data. NAC proposed that the sentence be modified so that the period would begin on the "date of receipt of such information."

IN ITS comments on fees, NAC recommended that the \$140 deposit required with a request for extension of an established tolerance to an additional commodity be reduced to \$50. The association said that this was recommended in view of the numerous requests that will be made to cover new uses and additional pests.

Under the original ruling, \$50 represents the non-returnable fee for handling and review of the petition and the remaining \$90, also nonreturnable, is for

consideration of the petition after it has been filed or for processing the request.

NAC added that fees for withdrawing a petition after filing and resubmitting it, or adding data after filing, should not exceed cost of filing a petition for expansion of existing tolerances. As presently set up, a \$150 fee is required in either case.

In its comments on fees, the association cited present uncertainties—whether or not the present schedule will curtail, to some degree, research and the availability of necessary chemicals for some major agricultural crops, "particularly those of relatively small volume," when compared to cotton, wheat and similar crops.

Because of this, the association expressed its desire to reserve the right to have a full review of the matter at a later date.

Two Ears of Corn

MUST reading for old-timers and late-comers in the fertilizer industry will probably be "Two Ears of Corn," the life of Charles H. MacDowell as written by Claire Leavitt MacDowell.

Born in 1867, the year that phosphate beds in South Carolina were first opened, the former head of Armour Fertilizer Works was intimately concerned with the development of the American fertilizer industry and was prominent in its activities.

The authoress reviews his life from boyhood days and early experiences in the world of business through his growth with Armour & co. and his pioneering in fertilizers and chemicals.

Considerable attention is given to the German potash controversy of 1909 and MacDowell's activities at the Paris Peace conference and his work in controlling chemical supplies for the War Industries Board during World War I.

The pages are sprinkled with familiar names—the Armours, DeWitt Brown, B. H. Brewster, Jr., Daniel Baugh, Horace Bowker, Fred Lodge, John Sanford, Robert Bradley, John Toll, Thomas Stewart and other prominent members of the industry. Companies such as Federal Chemical, Swift, F. S. Royster Guano, American Agricultural Chemical, Virginia-Carolina Chemical and H. J. Baker & Bro. make regular appearances.

For a few hours of reminiscing we suggest that you obtain a copy of this volume published by the Pequot Press, Stonington, Conn. (at \$5.00 a copy).

G. P. T. Jr.
Editor

FARM CHEMICALS

Chemicals

46—Acidulation Table

American Cyanamid offers a free table for calculating acidulation formulas which shows at a glance how to prepare the desired strength of acid. Cyanamid produces quality phosphate rock for acidulation, including washed and dried Florida pebble, ground rock and screened industrial grade.

CIRCLE 46 ON SERVICE CARD

47—Nitrolime

Available in free-flowing granular form, Bradley & Baker Nitrolime is a non acid forming fertilizer containing 20.5 per cent nitrogen, half in ammonia form and half as fast acting nitrate. For full information on this material

CIRCLE 47 ON SERVICE CARD

48—N Solutions

This season Nitrogen division is engaging in its biggest promotional campaign for Arcadian fertilizer products. Farm and local papers and radio will be used to push materials including non-pressure Uran and Feran and low-pressure Nitrane and Urasol solutions. As an Arcadian distributor the ad campaign will be of direct benefit to you. For full information

CIRCLE 48 ON SERVICE CARD

49—Tronabor Bulletin

A new Tronabor service bulletin has been issued by American Potash & Chem. in connection with use of the borate herbicide under asphaltic pavings on airports, highways, parking areas and for other applications. This supplements data in a previous bulletin describing other Tronabor uses.

CIRCLE 49 ON SERVICE CARD

50—Aldrin & Dieldrin

Shell Chemical points out that sales of these popular insecticides have been climbing with discovery of more and more uses. Formulators are aided in selling their aldrin and dieldrin formulations through strong, well-timed advertising and technical service and field representatives working with ag educators. For the latest available technical information

CIRCLE 50 ON SERVICE CARD

51—Crag Glyodin

A six page pamphlet from Carbide & Carbon Chem. describes the control of cherry leaf spot with Crag Fruit Fungicide 341, a glyodin solution. It discusses easy application methods and lists suggested spray schedules, compatibility data and usage costs.

CIRCLE 51 ON SERVICE CARD

52—Handling Chlorine

Safe handling of chlorine is reviewed in a 26 page, two-color brochure from Columbia-Southern. Included are details on shipping methods, handling instructions, care and return of containers and complete data on tracing and coping with leaks. For a copy

CIRCLE 52 ON SERVICE CARD

FREE INFORMATION to help you
solve fertilizer, pesticide problems

Reader Service

53—Pfizer AS-15

Pfizer As-15, agricultural streptomycin, is recommended by the manufacturer for use in your systemic spray formulations. It makes a potent anti-bacterial spray and offers top control of bacteria causing fire blight, bacterial spot of tomato and pepper, black leg of potatoes and other diseases. For a technical bulletin

CIRCLE 53 ON SERVICE CARD

56—Pyronyl Concentrate

Technical information has been issued by Prentiss Drug & Chem. on Prentox pyronyl dust concentrate which offers a high concentrate of pyrethrum on an economical basis in addition to the advantages of this insecticide plus those of piperonyl butoxide. This should be of special interest to those desiring a basic truck crop and garden insecticide.

CIRCLE 56 ON SERVICE CARD

Materials Handling

57—KBH Dealership

KBH corp. equipment for ammonia application includes a wide selection of front-mounted, rear-mounted and pull type models featuring extra strength construction. With new and expanding markets that make most farmers prospects for application equipment, a dealership may prove to be a profitable side-line. For full details

CIRCLE 57 ON SERVICE CARD

58—Electri-Facts

A brochure prepared by Clark Equipment cites the basic reasons for buying its electric fork trucks. General advantages for electric equipment include economy of operation, quietness, fume free operation and efficient use under temperature extremes. The booklet reviews the important features of Clark trucks.

CIRCLE 58 ON SERVICE CARD

59—Solution Transfer

Schelm Brothers is now delivering a complete package nitrogen solution transfer unit for trailer or truck mounting. Any size tank can be used and they are baffled and designed especially for transport service. For details

CIRCLE 59 ON SERVICE CARD

60—Variable Speed Drives

Speed changes with Link-Belt variable speed drives are quick and easy, requiring only a turn of the handwheel. All metal chain makes tooth-to-tooth contact with metal wheels to transmit power without slippage. Drives are available in sizes to 25 hp. Full details are contained in a L-B book.

CIRCLE 60 ON SERVICE CARD

How to use the READER SERVICE CARD

- Circle number of literature you want.
- Print or type your name, position, company and address.
- Clip and mail the Service Card.

54—Emulsifier 1917

Armour Chemical's new herbicide Emulsifier 1917 performs with both volatile and low vol esters of 2,4-D and 2,4,5-T providing stability and flash dispersion for as little as seven cents per gallon of concentrate. Rapid spreading and coverage with minimum run-off are cited as other advantages. For a free sample and a product data bulletin

CIRCLE 54 ON SERVICE CARD

55—Polybor Chlorate

Contact action for quick knockdown, and root action for complete destruction are the primary advantages of Polybor Chlorate from Pacific Coast Borax. Highly soluble, the combination borate-sodium chlorate herbicide is especially useful for quick destruction of tall standing vegetation where mowing or scalping is not considered desirable. More information is available.

CIRCLE 55 ON SERVICE CARD

61—Hand Lift Truck

A newly revised 4 page booklet from Yale & Towne describes its Zephyr Hand Lift truck, designed specifically to carry loads up to 1,000 lbs. Features include an easily accessible treadle elevation control, front wheel on ball bearing swivel and structural angles welded to a rigid deck. A table provides specifications for various models.

CIRCLE 61 ON SERVICE CARD

62—Car Unloader

Midstate Machinery has a new Over-Track unloader for removing materials from covered hopper cars. The unit can be used without a below-track hole, permitting operation at any point. Dust tight operation is claimed. For information

CIRCLE 62 ON SERVICE CARD

63—Car Puller

Two types of all purpose car pullers are made by Jeffrey Mfg., 5,000 and 10,000 lb. models. The units are applicable to car spotting operations, docking barges and other moving tanks. A specifications bulletin is available.

CIRCLE 63 ON SERVICE CARD

64—Marion Mixers

Rapids Machinery has released a two color brochure on its complete line of fertilizer mixers and accessory equipment. Included is a detailed illustration showing the exclusive Marion mixing and blending action. For a copy

CIRCLE 64 ON SERVICE CARD

Process Equipmt.

65—Jet Syphons

Steam and air jet syphons are the subject of a new bulletin from Schutte & Koerting. Included are data on application, construction and operation of jet syphons which utilize steam or air pressure energy to pump, heat and mix liquids, gases and slurries. Of special interest is their use in mixing of ammonia and water without use of a pump.

CIRCLE 65 ON SERVICE CARD

Packaging

66—Vulcan Drum

A new one gallon tight head drum available from stock which incorporates the features of standard size units is being produced by Vulcan Stamping & Mfg. Produced with regular interior coating or a hi-bake lining they are standard IC-17E containers, round, with welded side seams and double seam ends. The top is necked to provide for stable stacking. Plastic or metal pouring spouts are available.

CIRCLE 66 ON SERVICE CARD

67—Stoker Packers

Five low cost bag packers designed for dust free packaging of insecticides and most fertilizers are produced by H. L. Stoker. The standard models fill valve type bags, but attachments are available for use with open mouth sacks and drums. Units are fully equipped with motors, drives and controls and provide fast, accurate operation. Bulletins are available.

CIRCLE 67 ON SERVICE CARD

68—Schachte Weigher

The Schachte automatic weighing device from Molony Fertilizer is designed for accurate, fast, economical service in conjunction with standard bagging scales. No changes are required in present bagging units and installation can be accomplished in a matter of hours. Rates of 30-45 tons per hour with 100 lb. bags and 45-50 with 200 lb. sacks are claimed, and one man operation gives double the production of usual hand weighing equipment, according to the company. For full information

CIRCLE 68 ON SERVICE CARD

Miscellaneous

69—Safety Equipment

General Safety Equipmt. has released the 1955 issue of "Everything in Safety," a catalog of personal protective equipment and industrial safety devices. Containing 130 pages, it covers respiratory devices, eye protection, pumps, gloves and other equipment. To obtain a copy

CIRCLE 69 ON SERVICE CARD

70—NH₃ Catalog

Equipment for ammonia distributors is covered in the Rego NH₃ catalog from Bastian Blessing. Included are data on new additions to the line, a multi-purpose shut-off valve and 3/4 and one inch Rotogages. The latter are designed for use on mobile or stationary tanks.

CIRCLE 70 ON SERVICE CARD

71—Gro-Green Plants

H. D. Campbell offers manufacturing plants and formulation franchises for its Gro-Green liquid fertilizer for local areas. If interested in the offer

CIRCLE 71 ON SERVICE CARD

72—NH₃ Questionnaire

For those contemplating entry into the NH₃ field, Anco Mfg. & Supply has developed a bulk plant questionnaire. The company offers skilled engineering assistance in designing a plant that complies with existing legislation and will develop actual blueprints. For a copy of the questionnaire

CIRCLE 72 ON SERVICE CARD

73—Bin-Vue Units

A four page folder from Convair provides general information on Bin-Vue level indicators. The units operate in any position and are available in four models, standard, heavy duty, explosion proof and high temperature. Drawings and information on each are contained in the folder along with a description of their operation.

CIRCLE 73 ON SERVICE CARD

74—Soiltest Book

Soiltest has issued a new 104 page edition of their catalog describing apparatus for engineering tests of soils and construction materials. The complete selection of soil testing equipment will be of interest to many readers.

CIRCLE 74 ON SERVICE CARD

75—HNO₃ Plants

Nitric acid plants by Girdler employing the DuPont ammonia oxidation process are the subject of a four page folder. Included are a flow diagram of the process and a description of the process. Capital investment and operating costs are said to be lower than for atmospheric or low pressure oxidation methods, and yields of acid from ammonia range from 91 to 93 per cent depending on the temperature of available cooling water.

CIRCLE 75 ON SERVICE CARD

76—Battelle Research

The Battelle Memorial Institute has prepared a 24 page brochure describing the assistance rendered by the organization in solving technical problems. Included is information on the personnel and operation of the institute.

CIRCLE 76 ON SERVICE CARD

FARM CHEMICALS

See the Industry News section, pages
24-25 for information on these
Reader Service numbers—

77—HA Payloader

80—Spit Duster

78—Simplicity "C"

81—S/A Tellevol

79—New I & C Bagger

82—Hi-Yield Unit

Buyers' Guide

Classified Index to Advertisers in 'Farm Chemicals'

ALDRIN

Ashcraft-Wilkinson Co., Atlanta, Ga.
Pittsburgh Coke & Chem. Co., Agr. Chem. Div.,
Pittsburgh, Pa.
Shell Chemical Co., Agr. Chem. Div., Denver, Colo.

AMMONIA—Anhydrous and Liquor

Commercial Solvents Corporation, New York City
Grand River Chem. Div., Deere & Co., Tulsa, Okla.
Lion Oil Co., El Dorado, Ark.
Nitrogen Div., Allied Chemical & Dye Corp., N.Y.C.
Phillips Chemical Co., Bartlesville, Okla.
U. S. Industrial Chemicals, New York City

AMMONIA APPLICATORS

KBH Corp., Clarksdale, Miss.

AMMONIUM NITRATE

Ashcraft-Wilkinson Co., Atlanta, Ga.
Commercial Solvents Corporation, New York City
Lion Oil Co., El Dorado, Ark.
Phillips Chemical Co., Bartlesville, Okla.

AMMONIUM PHOSPHATE

Monsanto Chem. Co., St. Louis, Mo.

AMMONIUM SULFATE

See Sulfate of Ammonia

BAGS—Multwall-Paper

International Paper Co., Bagpak Div., N. Y. C.
Hammond Bag & Paper Co., Wellsburg, W. Va.
Kraft Bag Corporation, New York City
Union Bag & Paper Corp., New York City

BAGS—Dealers and Brokers

Ashcraft-Wilkinson Co., Atlanta, Ga.
McIver & Son, Alex. M., Charleston, S. C.

BAG CLOSING MACHINES

International Paper Co., Bagpak Div., N. Y. C.

BAG PRINTING MACHINES

Schmutz Mfg., Louisville, Ky.

BAG FILLING MACHINES

Stedman Foundry and Machine Co., Aurora, Ind.
Union Bag & Paper Corp., New York City

BHC AND LINDANE

Ashcraft-Wilkinson Co., Atlanta, Ga.
Diamond Alkali Co., Newark, N. J.
Pennsylvania Salt Mfg. Co., of Wash., Tacoma,
Wash.
Pittsburgh Coke & Chem. Co., Agr. Chem. Div.,
Pittsburgh, Pa.

BONE PRODUCTS

American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
Jackle, Frank R., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

BORAX AND BORIC ACID

American Potash & Chemical Corp., Los Angeles,
California
Woodward & Dickerson, Inc., Philadelphia, Pa.

BROKERS

Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
Jackle, Frank R., New York City
Keim, Samuel D., Philadelphia, Pa.
McIver & Son, Alex. M., Charleston, S. C.
Woodward & Dickerson, Inc., Philadelphia, Pa.

CALCIUM ARSENATE

American Agricultural Chemical Co., N. Y. C.

CARS AND CART

Atlanta Utility Works, The, East Point, Ga.
Stedman Foundry and Machine Co., Aurora, Ind.

CASTOR POMACE

Ashcraft-Wilkinson Co., Atlanta, Ga.
McIver & Son, Alex. M., Charleston, S. C.

CHEMISTS AND ASSAYERS

Shuey & Co., Inc., Savannah, Ga.

CHLORDANE

Ashcraft-Wilkinson Co., Atlanta, Ga.
Pittsburgh Coke & Chem. Co., Agr. Chem. Div.,
Pittsburgh, Pa.

CLAY

Ashcraft-Wilkinson Co., Atlanta, Ga.

CONDITIONERS

Ashcraft-Wilkinson Co., Atlanta, Ga.
Jackle, Frank R., New York City
Keim, Samuel D., Philadelphia, Pa.
McIver & Son, Alex. M., Charleston, S. C.
National Lime & Stone Co., Findlay, Ohio

CONVEYORS

Power-Curve Conveyor Co., Denver, Colo.
Link-Belt Co., Chicago, Ill.
Stedman Foundry and Machine Co., Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

COPPER SULFATE

Tennessee Corp., Atlanta, Ga.

COTTONSEED PRODUCTS

Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
Jackle, Frank R., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

CUSTOM PESTICIDE FORMULATION

Barco Chemicals, Inc., Des Moines, Ia.

DDT

Ashcraft-Wilkinson Co., Atlanta, Ga.
Diamond Alkali Co., Newark, N. J.
Pittsburgh Coke & Chem. Co., Agr. Chem. Div.,
Pittsburgh, Pa.

DIELDRIN

Ashcraft-Wilkinson Co., Atlanta, Ga.
Pittsburgh Coke & Chem. Co., Agr. Chem. Div.,
Pittsburgh, Pa.
Shell Chem. Corp., Agr. Chem. Div., Denver, Colo.

DILUENTS

Ashcraft-Wilkinson Co., Atlanta, Ga.
Pioneer Pyrophyllite Producers, Beverly Hills,
Calif.
Pittsburgh Coke & Chem. Co., Agr. Chem. Div.,
Pittsburgh, Pa.
Thomas Alabama Kaolin Co., Baltimore, Md.

DITHIOCARBAMATES

Berkshire Chemicals, New York City

DUST APPLICATORS

Raw Materials Trading Co., New York City

ELEVATORS

Power-Curve Conveyor Co., Denver, Colo.
Link-Belt Co., Chicago, Ill.
Stedman Foundry and Machine Co., Aurora, Ind.

ENGINEERS—Chemical and Industrial

Chemical Construction Corp., New York City
Marietta Concrete Corporation, Marietta, Ohio
Stedman Foundry and Machine Co., Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

FERTILIZER—Liquid

Clover Chemical Co., Pittsburgh, Pa.

FERTILIZER—Mixed

American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Davison Chemical Co., div. of W. R. Grace & Co.,
Baltimore, Md.
International Min. & Chem. Corp., Chicago, Ill.

FILLERS

Bradley & Baker, N. Y. C.

FISH SCRAP AND OIL

Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
Jackle, Frank R., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

FULLER'S EARTH

Ashcraft-Wilkinson Co., Atlanta, Ga.

FUNGICIDES

American Agricultural Chemical Co., N. Y. C.
Berkshire Chemicals, New York City
Pittsburgh Coke & Chemical Co., Agr. Chem. Div.,
Pittsburgh, Pa.
Tennessee Corp., Atlanta, Ga.

HERBICIDES

American Potash & Chemical Corp., Los Angeles,
California
Barco Chemicals, Inc., Des Moines, Ia.
Diamond Alkali Co., Newark, N. J.
Lion Oil Company, El Dorado, Ark.
Pittsburgh Coke & Chem. Co., Agr. Chem. Div.,
Pittsburgh, Pa.

HERBICIDES—Oils

Lion Oil Company, El Dorado, Ark.

HOPPERS & SPOUTS

Stedman Foundry and Machine Co., Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

IMPORTERS, EXPORTERS

Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Berkshire Chemicals, New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

INSECTICIDES

American Agricultural Chemical Co., N. Y. C.
American Potash & Chemical Corp., Los Angeles,
California
Ashcraft-Wilkinson Co., Atlanta, Ga.
Barco Chemicals, Inc., Des Moines, Ia.
Berkshire Chemicals, New York City
Diamond Alkali Co., Newark, N. J.
Fairfield Chem. Div., Food Mach. & Chem. Corp.,
New York City
Pennsylvania Salt Mfg. Co., of Wash., Tacoma,
Wash.
Pittsburgh Coke & Chem. Co., Agr. Chem. Div.,
Pittsburgh, Pa.
Shell Chem. Corp., Agr. Chem. Div., Denver, Colo.

IRON SULFATE

Tennessee Corp., Atlanta, Ga.

KAOLIN

Thomas Alabama Kaolin Co., Baltimore, Md.

LEAD ARSENATE

American Agricultural Chemical Co., N. Y. C.

LIMESTONE

American Agricultural Chemical Co., N. Y. C.
Ashcraft-Wilkinson Co., Atlanta, Ga.
National Lime & Stone Co., Findlay, Ohio

MACHINERY—Acid Making and Handling

Chemical Construction Corp., New York City
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Stedman Foundry and Machine Co., Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

MACHINERY—Acidulating

Chemical Construction Corp., New York City
Stedman Foundry and Machine Co., Aurora, Ind.

MACHINERY—Grinding and Pulverizing

Bradley Pulverizer Co., Allentown, Pa.
Poulsen Co., Los Angeles, Calif.
Stedman Foundry and Machine Co., Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

Buyers' Guide

MACHINERY—Material Handling

Clark Equip. Co., Construction Mach. Div., Benton Harbor, Mich.
Hough, The Frank G. Co., Libertyville, Ill.
Jaeger Machine Co., Columbus, O.
Link-Belt Co., Chicago, Ill.
Poulsen Co., Los Angeles, Calif.
Power-Curve Conveyor Co., Denver, Colo.
Sauerman Bros. Inc., Chicago, Ill.
Stedman Foundry and Machine Co., Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

MACHINERY—Mixing, Screening and Bagging
Poulsen Co., Los Angeles, Calif.
Stedman Foundry and Machine Co., Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

MACHINERY—Power Transmission

Link-Belt Co., Chicago, Ill.
Stedman Foundry and Machine Co., Aurora, Ind.

MACHINERY

Superphosphate Manufacturing

Link-Belt Co., Chicago, Ill.
Stedman Foundry and Machine Co., Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

MAGNESIUM SULFATE

Berkshire Chemicals, New York City

MANGANESE SULFATE

Tennessee Corp., Atlanta, Ga.

MANURE SALTS

Potash Co. of America, Washington, D. C.

MINOR ELEMENTS

Tennessee Corporation, Atlanta, Ga.

MIXERS

Atlanta Utility Works, The, East Point, Ga.
Stedman Foundry and Machine Co., Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

NITRATE OF POTASH

Berkshire Chemicals, New York City

NITRATE OF SODA

American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
McIver & Son, Alex. M., Charleston, S. C.
Nitrogen Div., Allied Chemical & Dye Corp., N. Y. C.
International Min. & Chem. Corp., Chicago, Ill.
Woodward & Dickerson, Inc., Philadelphia, Pa.

NITROGEN SOLUTIONS

Commercial Solvents Corporation, New York City
Nitrogen Div., Allied Chemical & Dye Corp., N. Y. C.
Lion Oil Company, El Dorado, Ark.
Phillips Chemical Co., Bartlesville, Okla.

NITROGEN MATERIALS—Organic

American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
International Min. & Chem. Corp., Chicago, Ill.
Jackie, Frank R., New York City
McIver & Son, Alex. M., Charleston, S. C.
Smith Rowland Co., Norfolk, Va.
Woodward & Dickerson, Inc., Philadelphia, Pa.

NOZZLES—Spray

Monarch Mfg. Works, Philadelphia, Pa.
Spraying Systems Co., Bellwood, Ill.

PARATHION

Ashcraft-Wilkinson Co., Atlanta, Ga.
Pittsburgh Coke & Chem. Co., Agr. Chem. Div., Pittsburgh, Pa.

PHOSPHATE ROCK

American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.

Bradley & Baker, N. Y. C.
International Min. & Chem. Corp., Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Woodward & Dickerson, Inc., Philadelphia, Pa.

PHOSPHORIC ACID

American Agricultural Chemical Co., N. Y. C.

PLANT CONSTRUCTION—Fertilizer and Acid

Atlanta Utility Works, The, East Point, Ga.
Chemical Construction Corp., New York City
Link-Belt Co., Chicago, Ill.
Stedman Foundry and Machine Co., Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

POTASH—Muriate

American Potash & Chemical Corp., Los Angeles, California
Ashcraft-Wilkinson Co., (Duval Potash) Atlanta, Ga.
Bradley & Baker, N. Y. C.
Duval Sulphur & Potash Co., Houston, Tex.
International Min. & Chem. Corp., Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Potash Co. of America, Washington, D. C.
Southwest Potash Corporation, New York City
United States Potash Co., N. Y. C.

POTASH—Sulfate

American Potash & Chemical Corp., Los Angeles, California
International Min. & Chem. Corp., Chicago, Ill.
Potash Co. of America, Washington, D. C.

PRINTING PRESSES—Bag

Schmuts Mfg. Co., Louisville, Ky.

PYROPHYLLITE

Ashcraft-Wilkinson Co., Atlanta, Ga.
Pioneer Pyrophyllite Producers, Beverly Hills, Calif.

REPAIR PARTS AND CASTINGS

Atlanta Utility Works, The, East Point, Ga.
Stedman Foundry and Machine Co., Aurora, Ind.

SCALES—Including Automatic Baggers

Atlanta Utility Works, The, East Point, Ga.
Stedman Foundry and Machine Co., Aurora, Ind.

SCRAPER MACHINES

Sauerman Bros., Inc., Chicago, Ill.

SCREENS

Atlanta Utility Works, The, East Point, Ga.
Stedman Foundry and Machine Co., Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

SHOVEL LOADERS

Clark Equip. Co., Benton Harbor, Mich.
Hough, The Frank G. Co., Libertyville, Ill.
Jaeger Machine Co., Columbus, O.

SPRAYS

Monarch Mfg. Works, Inc., Philadelphia, Pa.
Spraying Systems Co., Bellwood, Ill.

STORAGE BUILDINGS

Butler Manufacturing Co., Kansas City, Mo.
Marietta Concrete Corporation, Marietta, Ohio

STORAGE TANKS

Broadway Rubber Corp., Louisville, Ky.
Butler Manufacturing Co., Kansas City, Mo.
Cole, R. D., Manufacturing Co., Newnan, Ga.

SULFATE OF AMMONIA

American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
Jackie, Frank R., New York City
Lion Oil Co., El Dorado, Ark.
Nitrogen Div., Allied Chemical & Dye Corp., N. Y. C.
Phillips Chemical Co., Bartlesville, Okla.
Woodward & Dickerson, Inc., Philadelphia, Pa.

SULFATE OF POTASH—MAGNESIA

International Min. & Chem. Corp., Chicago, Ill.

SULFUR

Ashcraft-Wilkinson Co., Atlanta, Ga.
Texas Gulf Sulphur Co., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

SULFUR—Dusting & Spraying

Ashcraft-Wilkinson Co., Atlanta, Ga.
U. S. Phosphoric Products Div., Tennessee Corp., Tampa, Fla.

SULFURIC ACID

American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
International Min. & Chem. Corp., Chicago, Ill.
Lion Oil Company, El Dorado, Ark.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.

SUPERPHOSPHATE

American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
Davison Chemical Co., div. of W. R. Grace & Co., Baltimore, Md.
International Min. & Chem. Corp., Chicago, Ill.
Jackie, Frank R., New York City
McIver & Son, Alex. M., Charleston, S. C.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
Woodward & Dickerson, Inc., Philadelphia, Pa.

SUPERPHOSPHATE—Concentrated

Armour Fertilizer Works, Atlanta, Ga.
Bradley & Baker, N. Y. C.
International Min. & Chem. Corp., Chicago, Ill.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
Woodward & Dickerson, Inc., Philadelphia, Pa.

TALC

Ashcraft-Wilkinson Co., Atlanta, Ga.

TANKAGE

American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
International Min. & Chem. Corp., Chicago, Ill.
Jackie, Frank R., New York City
McIver & Son, Alex. M., Charleston, S. C.
Smith-Rowland Co., Norfolk, Va.
Woodward & Dickerson, Inc., Philadelphia, Pa.

TANKS—NH₃ and Liquid N

Broadway Rubber Corp., Louisville, Ky.
Butler Manufacturing Co., Kansas City, Mo.
Cole, R. D., Manufacturing Co., Newnan, Ga.
KBH Corporation, Clarksdale, Miss.

TOXAPHENE

Ashcraft-Wilkinson Co., Atlanta, Ga.
Pittsburgh Coke & Chem. Co., Agr. Chem. Div., Pittsburgh, Pa.

2, 4-D

Diamond Alkali Co., Newark, N. J.
Pittsburgh Coke & Chem. Co., Agr. Chem. Div., Pittsburgh, Pa.

2, 4, 5-T

Diamond Alkali Co., Newark, N. J.
Pittsburgh Coke & Chem. Co., Agr. Chem. Div., Pittsburgh, Pa.

UREA & UREA PRODUCTS

Bradley & Baker, N. Y. C.
Grand River Chem. Div., Deere & Co., Tulsa, Okla.
Nitrogen Div., Allied Chemical & Dye Corp., N. Y. C.

VALVES

Monarch Mfg. Works, Inc., Philadelphia, Pa.

ZINC SULFATE

Tennessee Corp., Atlanta, Ga.

FARM CHEMICALS



GIANT SERVANT OF AGRICULTURE

It is called potash because in primitive times it *was* ash, from burned wood. But when man found potash among nature's own mineral deposits, it grew to gianthood as this nation grew.

This giant servant has helped to make America great, with bountiful harvests.

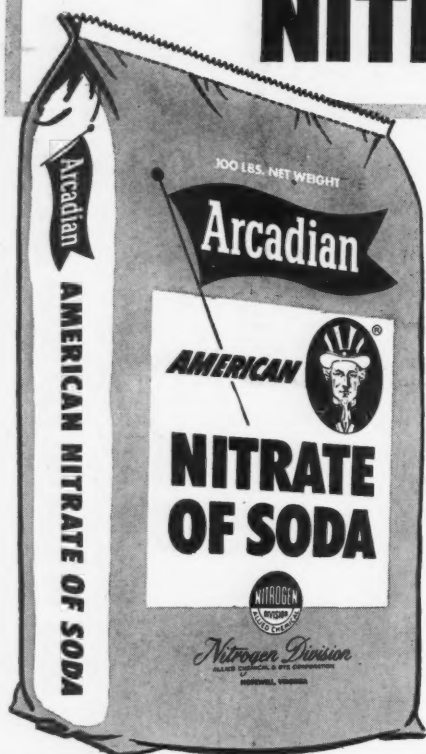
In its way, Potash Company of America is a giant servant, too. Our help to productive agriculture, through better fertilizers, has meant a share in America's growth—and we are proud of that share.



POTASH COMPANY OF AMERICA CARLSBAD, NEW MEXICO.

General Sales Office . . . 1625 Eye Street, N.W., Washington, D.C.
Midwestern Sales Office . . . First National Bank Bldg., Peoria, Ill.
Southern Sales Office . . . Candler Building, Atlanta, Ga.

NEW STYLE AMERICAN NITRATE OF SODA



Best ever produced — New-process **ARCADIAN®** American Nitrate of Soda has the improved physical condition that puts it in the top rank for ready handling and easy spreading.

Big, triple-screened crystals as made by **ARCADIAN** give your customers all the advantages of 16% quick-acting nitrate nitrogen that is free-flowing in any method of application, and that holds physical condition better in storage. Also provides the benefits of 26% sodium content.

**Check
Your Stocks
NOW!**

—make sure you get enough of the improved **ARCADIAN** American Nitrate of Soda, best for you because it's best for your customers. See us now.

Arcadian®

PRODUCTS FOR PROFITABLE FARMING

Nitrogen Solutions
(**NITRANA®** and **URANA®**)

AMERICAN
Nitrate of Soda

A-N-L®
Nitrogen Fertilizer

Urea Products

Sulphate of Ammonia



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Columbia 1, S. C. • Omaha 7, Neb. • San Francisco 3, Cal. • Los Angeles 15, Cal.

ESTABLISHED
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51

